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Botanical Memoirs

No. 2

THE ACANTHACEAE OF BOMBAY

BY

H. SANTAPAU, S.J., F.L.S.

St. Xavier's College, Bombay,
India.

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UNIVERSITY OF BOMBAY

BOTANICAL MEMOIRS: No. 2.

The Acanthaceae of Bombay

BY

THE REV. H. SANTAPAU, S.J.

St. Xavier's College, Bombay,

INDIA.

1951

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PREFACE

One of the fruitful ways of cultivating wide interest in plants is to write a flora of local plants giving precise information regarding the localities, habit and habitats, the time of flowering etc. The importance of such works can hardly be overestimated in our country where so few local floras are available. This becomes the more important now than before, as the official agency for the study of plants and spread of their knowledge, namely, the Botanical Survey of India is practically defunct, despite the repeated requests made by botanists all over the country. This, I believe is a serious handicap to the progress of Botany in our country and earnestly hope that both the Central and local Governments would take more interest in this silent nation-building activity. It is obvious that no progress in the utilisation of local plants and their products for our economic exploitation can really be made without having definite information about their availability both in quantity and quality.

Out of some such considerations, the Government of Bombay, with the approval of the Secretary of State for India, asked by about 1898, Dr. Theodore Cooke, the then Principal of the College of Science, Poona, to compile a flora of the Plants of Bombay Presidency by giving him the necessary assistance and grants. He undertook this work with the help of Mr. Woodrow, Mr. Bhide, and that indefatigable collector of plants, Bhiva, frequently mentioned in Cooke's work, "*Flora of the Presidency of Bombay.*" The different parts of this work appeared in between 1901-1908 and formed an excellent supplement to Sir J. D. Hooker's "*Flora of British India*" (1872-1897). A necessary adjunct to this work was also built, namely, an herbarium of Bombay plants in the then College of Science, but now located at the College of Agriculture, Poona, as the College of Science was later transformed into College of Engineering, Poona. Unfortunately the original set of plants of the Bombay Presidency on which Cooke based his flora got burnt in a fire in May 1902 and was replaced by a duplicate set which Dr. Cooke possessed. I believe this also needs considerable renovation now ; and it is hoped that the Government would take early steps to do so, by establishing a Botanical survey of Bombay if needs be. Fortunately for us there has been an excellent tradition of works on taxonomy

in the Bombay Presidency nurtured mostly by non-botanists such as Stocks, Ritchie, Gamble, Law, Graham, Nimmo, Dalzell and Gibson, Lisboa, Dalgado, Talbot, Kirtikar, Birdwood, Jai Krishna Indraji, Sedgwick and others. For a number of years Dalzell and Gibson's "*Bombay Flora*" published in 1861 was the only work for reference. This was greatly augmented by Cooke's work who added not less than 500 new plants to Dalzell's list and made it an up-to-date one up to his times. But after all taxonomy is not a static science. As new information accumulates, our ideas change and it becomes necessary to have our floras re-written: and this is what also happened in the case of Cooke's *Flora of Bombay Presidency*. Immediately on the verge of finishing Cooke's work Professor Hate, then of the Wilson College and the Rev. Father Ethelbert Blatter started their observations on Bombay plants afresh, and the latter wrote a series of articles between 1926-1935, some of the posthumous, revising the Bombay plants. Father Blatter had a band of young enthusiastic workers around him like Professor Hallberg, Professor D'Almeida, Mr. Sedgwick, Dr. T. S. Sabnis, Mr. Charles McCann, Mr. Bhide, Mr. Millard, Mr. Fernandes and others who made extensive collections of plants of Western India and greatly added to our knowledge of the Bombay Flora. The present memoir dealing with the Acanthaceæ of Bombay has emanated from the same school of workers and comes from an experienced field-worker on the plants of the Bombay Presidency, the Rev. Father H. Santapau, S.J. of the St. Xavier's College, Bombay. Father Santapau after his intensive training at London University and Kew has been taking pains to revive interest in taxonomic studies on modern lines and has been continuing the work of revising Bombay plants started by Blatter. Many new records of indigenous and exotic plants are being made and the study of taxonomy has once again become a living subject. His papers dealing with the Flora of Khandala are widely appreciated. He combines in him the enthusiasm of a field-worker for new types, ecotypes, species and varieties with the patience and expert knowledge of a herbarium taxonomist: and the result invariably is an excellent picture of families and plants dealt with a remarkable detail. Father Santapau has taken all care in compiling this volume by comparing and listing all the plants he could get at Kew and other herbaria and has also added the information based on his own observations. As will be seen from the introduction and text, he has clarified

some notable points in the morphology and nomenclature of these plants having several endemic representatives in the Bombay Flora. He has also added a few new ones not mentioned by Cooke and others (pp. 34, 42, 52, 62, 68, 80). The main features of the family have been recapitulated in the introduction and their taxonomic and economic importance cited. There is little doubt that the monograph will be quite helpful to workers on this family, several members of which like *Asteracantha, Hygrophila,* species of *Acanthus* like *A. ilicifolius* offer excellent scope for embryological studies. I do hope that this monograph will be followed by revision of other important families in the Bombay Flora which the University should be glad to publish.

The present monograph "*The Acanthaceæ of Bombay*" is the second memoir in the Botanical Series started by the University of Bombay and will soon be followed by a third one. The students and workers on Bombay plants should find it useful.

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Bombay 1, India.

15th December, 1951.

T. S. MAHABALE

CARVIA CALLOSA Bremek.

THE ACANTHACEAE OF BOMBAY

by

H. SANTAPAU, S. J., F.L.S.,

St. Xavier's College, Bombay.

INTRODUCTION

This interesting tropical family has for many years attracted my attention both in the field and in the herbarium. Soon after I began working in the exploration of Khandala, I was fortunate enough to observe one of the rare general flowerings of the group of plants hitherto known as "*Strobilanthes,*" and this, to some extent, induced me to pay particular attention to such a striking family.

From the first my experiences in the study of the *Acanthaceæ* were not too happy ; as the structure of the flowers, seeds, capsules, etc. is so typical, I found it relatively easy to place a given plant in the family ; but my real troubles began when I tried to determine the genus of a particular plant. The differences between any two allied genera are often very slight, not seldom microscopic, and there are many and puzzling intermediate stages. After more than ten years of constant study, I think that I am beginning to get an insight into the family.

In the field of taxonomy, one of the greatest difficulties in the delimitation of the various genera of the family is the constant conflict of opinion that one may see in the botanical literature of the last 150 years. Former authors, like Nees, Anderson, Clarke, etc., often grouped together under one genus plants of very different characters. After the masterly paper by Radlkofer in 1883, more attention has been paid to the character of the pollen grains, a good character in general, but one that admits of too many exceptions in practice. In recent times Dr. Bremekamp in Holland has been studying the *Acanthaceæ* as no other author had done before him ; he has paid special attention to the assemblage of characters rather than to any one in particular, except for the structure of the pollen grains. In the

following pages I have made much use of the data kindly supplied by Dr. Bremekamp himself, to whom from these pages I wish to extend my sincere thanks.

According to Rendle (Class. Flow. Pl. 2: 544, 1938), the family consists of about 220 genera and over 2000 species. In Bombay State we have 42 genera and about 130 species or varieties represented; among these Bombay plants, several genera are represented by only one species, and among the species several are endemic in Bombay.

The climbing habit is represented by *Thunbergia;* shrubs or small trees are not numerous as far as the number of genera or species are concerned, but they are very conspicuous for their abundance and the showy character of their flowers; thus, for instance, the group of "*Strobilanthes*" is not too rich in species, but, at least in Western India, forms perhaps the most striking feature of the vegetation on many of our hills.

Many of the *Acanthaceæ* of Bombay are typically hygrophitic in character, growing in damp or marshy places; a good many are typically xerophytes; but most of the plants of either group exhibit a remarkable degree of adaptation to the most diverse conditions. Thus, for instance, the genus *Hygrophila* is generally found in marshes or near water, by the sides of pools, tanks, etc., but even when the ground has become almost completely dry such plants can be seen to all appearances in perfect condition. On the other hand many of the species of *Barleria* prefer a drier ground and in structure show many of the characters of the xerophytes; but *Barleria prionitis,* to cite but one example, can be seen thriving as a bushy, large-leaved, many-flowered shrub in the second half of the monsoon.

Cystoliths are a very constant character in the leaves of many genera; their shape, direction and abundance may even serve as a fairly good diagnostic character. Spines are also found in several genera; they may be present together with large mesophytic leaves in the course of and immediately after the rains; in the dry season, after the fall of the larger leaves, such spines become prominent and give to some of the plants a truly formidable appearance.

Bracts and bracteoles are generally present and are often rather showy, as in *Justicia ramosissima, Ecbolium linneanum,* etc.; but among wild plants in Bombay they are seldom coloured other than green; their size, structure and arrangement are good diagnostic characters.

Flowers are remarkably uniform in structure, conforming to the general floral formula of S 5, P 5, A 5, G(2) but generally there is

a reduction in the number of the parts, particularly in the androecium, and several of the whorls are more or less deeply united or fused. The calyx in *Thunbergia* is reduced to a narrow ring, the usual function of the calyx being performed by large bracteoles. The corolla has a longer or shorter tube, narrow and uniformly broad in several, widening upwards or infundibuliform in most other genera. The corolla limb may be more or less subequally 5-lobed in *Thunbergia, Ruellia, Hemigraphis* or *Neuracanthus* and other genera ; or it may be clearly two-lipped in the greater number of plants of the family ; in a few genera, as *Acanthus, Blepharis,* etc., the upper lip is absent ; whilst most genera have an erect and bifid upper lip. For the purposes of classification, much use is made, particularly by the older authors, of the æstivation of the corolla, on the basis of which the family is divided into *Cortortæ* and *Imbricatæ.*

The number of stamens in our Bombay plants is never 5 ; 4 or 2 stamens are the rule here ; the fifth stamen may be represented by a staminode or more often is completely absent. The anther cells show considerable variation both in numbers and in the relative position ; some of the genera show a small spur-like structure at the base of one of the anther cells. The sculpturing of the pollen grains and their general outline is varied, but seems to be constant for a given group of plants, and is often used as the basis for classification.

The capsule is perhaps the most typical part of the family ; it is bilocular, dehiscing loculicidally to the base, and in shape it may be cylindrical or club-shaped, often compressed at right angles to the septum, and bearing 2—10 seeds in two rows. In many of the genera the seeds rest on a " hard retinaculum," as Cooke calls it, a modification of the funicle which considerably helps in the scattering of the seeds over large areas. When this " retinaculum " is absent, the seeds are often covered with hairs or scales that on becoming wet stand erect and help the anchoring of the seeds in a suitable medium.

Economically the family is of little importance, except for a number of garden plants. Several of our wild *Acanthaceæ* could very well be cultivated for their flowers ; but somehow or other there seems to be a very strong prejudice against them among Bombay gardeners.

In the following pages I have mentioned a number of herbarium specimens from Kew or Blatter Herbarium ; on purpose I have generally omitted mentioning the very large number of sheets from Khandala, the reason being that all such specimens are being listed in my Flora of Khandala, which is now ready for publication. I have tried to

bring the nomenclature up to date, a point in which Cooke's Flora seems to be more than ordinarily deficient ; this work was carried out in the library and herbarium of Kew Gardens, London. A number of species described after the publication of Cooke's Flora are added, and a number of species that Cooke either failed to mention or excluded from his book are also mentioned when the evidence in favour of their inclusion seemed to me to be satisfactory.

For the rest I wish to call the attention of readers to the fact that in this paper I do not intend giving a full description of all our Bombay species ; I have given but a few striking notes that may help the field botanist in the identification of the *Acanthaceæ ;* this paper is intended to be a complement to or a revision of Cooke's Flora of Bombay Presidency.

KEY TO THE ACANTHACEAE

(adapted from Cooke)

1. Climbers ; seeds not supported on hard retinacula:
   2. Calyx minute, annular or 10-15-toothed ; pollen globose obscurely banded, smooth or very minutely tuberculate ... ... *Thunbergia.*
   2. Calyx 5-lobed, often obscurely ; pollen cog-wheel-shaped ... ... *Meyenia.*

1. Erect or prostrate, not climbing, herbs or shrubs:
   3. Seeds not supported on hard retinacula ; ovules many in each cell :
      4. Ovules superposed in 2 rows in each cell ; corolla lobes imbricate ; leaves not pinnately divided:
         5. Calyx 4-partite ; stamens 2:
            6. Bracts rigid ; peduncle of spike covered with alternate scales ... ... *Elytraria.*
            6. Bracts herbaceous, spikes sessile or, if pedunculate, the peduncle without scales ... ... *Nelsonia.*
         5. Calyx 5-partite ; stamens 4 ... ... *Staurogyne.*
      4. Ovules not in 2 rows in each cell ; corolla lobes contorted, twisted to the left in bud ; lower leaves pinnately divided ... ... *Cardanthera.*
   3. Seeds supported on hard, upward-curved retinacula:
      7. Corolla without an upper lip ; lower lip large, expanded, 3-lobed ; ovules 2 in each cell:

8. Lower filaments with an excurrent process ... ... *Blepharis.*
8. Lower filaments without such a process. *Acanthus.*
7. Corolla 2-lipped or with 5 subequal lobes:
9. Corolla lobes twisted to the left in bud:
10. Ovules more than 2 in each cell; capsule normally with 6 or more seeds:
11. Corolla distinctly 2-lipped:
12. Inflorescence spinous ... ... *Asteracantha.*
12. Inflorescence not spinous ... ... *Hygrophila.*
11. Corolla subequally 5-lobed:
13. Inflorescence in lax, axillary cymes; cymes at times forming large terminal panicle ... ... *Ruellia.*
13. Inflorescence of single axillary flowers, or in axillary triads, or 2—3 flowers superposed ... ... *Dipteracanthus.*
13. Inflorescence a capituliform compound spike surrounded by four large ovate bracts ... ... *Gantelbua.*
13. Inflorescence a more or less elongated simple spike provided with but one kind of bracts ... ... *Hemigraphis.*
10. Ovules 2 in each cell; capsule with 4 or fewer seeds:
14. Placentas separating elastically from the base of the ripe capsule; stamens 4:
15. Bracteoles very large, reticulately nerved ... ... *Petalidium.*
15. Bracteoles 0 ... ... *Phaulopsis.*
14. Placentas not separating elastically from the base of the ripe capsule:
16. Anthers minutely mucronate or spurred at base; stamens 4 ... *Dyschoriste.*
16. Anthers not spurred at base:
17. Corolla subequally 5-lobed:
18. Corolla tube long, linear, slender; stamens 2 ... *Eranthemum.*
18. Corolla tube narrow below, usually infundibuliform upwards; stamens usually 4: see genera under ..." *Strobilanthes.*"
17. Corolla deeply 2-lipped stamens 4 ... ... *Calacanthus.*

9. Corolla lobes imbricate in bud:
  19. Ovules 3-10 in each cell; capsule normally 6 or more-seeded:
    20. Capsule compressed at right angles to the septum; seeds ovoid, hardly compressed:
      21. Flowers in panicled often unilateral racemes without axillary cladodes ... ... *Andrographis.*
      21. Flowers clustered in the midst of axillary cladodes ... ... *Haplanthus.*
    20. Capsule subterete; seeds much compressed ... ... *Gymostachyum.*
  19. Ovules 2 or rarely 1 in each cell:
    22. Corolla lobes 5, subequal:
      23. Anthers 1-celled; stamens 4, didynamous; calyx 5-partite, the 2 inner sepals smaller than the outer ... *Crossandra.*
      23. Anthers 2-celled:
        24. Calyx 4-partite, the 2 opposite outer sepals much larger than the inner; stamens 2 only perfect ... ... *Barleria.*
        24. Calyx 2-lipped, 5-lobed; stamens 4 ... ... *Neuracanthus.*
        24. Calyx segments 5, subequal, small:
          25. Stamens 4; corolla tube inflated above ... ... *Asystasia.*
          25. Stamens 2; corolla tube long, slender ... ... *Pseuderanthemum.*
    22. Corolla distinctly 2-lipped:
      26. Stamens 4; anthers 2-celled ... ... *Lepidagathis.*
      26. Stamens 2:
        27. Anthers 1-celled; bracts larger than the calyx segments ... ... *Hypoestes.*
        27. Anthers 2-celled:
          28. Placentas separating elastically from the valves from the base upwards:
            29. Bracts in unilateral spikes ... ... *Rungia.*
            29. Bracts clustered in the leaf-axils or laxly cymose ... *Dicliptera.*
          28. Placentas not separating elastically from the valves:

30. Anther cells parallel, subequal, bracts large, imbricate ... ... *Ecbolium.*
30. Anther cells one higher than the other:
31. Anther cells at least the lower, with a basal spur-like appendage:
32. Capsule usually 4-seeded; seeds rough or tuberculate ... *Justicia.*
32. Capsule 2-seeded; seeds smooth, usually shining ... ... *Monechma.*
31. Anther cells not spurred at base:
33. Anther cells apiculate .. *Adhatoda.*
33. Anther cells muticous:
34. Bracts and bracteoles small subequal; corolla white ... *Rhinacanthus.*
34. Bracts larger than bracteoles, in opposite valvate pairs; corolla rose or purple ... ... *Peristrophe.*

1. THUNBERGIA Retz.

The name *Thunbergia* Retz. is a " nomen conservandum " against *Thunbergia* Montin (1773) and other later names.

Key to the Bombay species of Thunbergia (adapted from Gamble):

An erect shrub, not climbing nor twining ... ... *erecta.*
Climbers or twiners:

Flowers axillary, solitary or in pairs, on long pedicels ; calyx 10—16-toothed:

Flowers white ; petioles not winged ... ... *fragrans.*
Flowers yellow ; petioles winged ... ... *lata.*

Flowers in racemes ; calyx an entire or crenulate ring:
Flowers yellow ... ... *mysorensis.*
Flowers blue or purple or lilac ... ... *grandiflora.*

1. **Thunbergia fragrans** Roxb., Pl. Cor. 1 : 47, t.67, 1795 ; Graham, Cat. 163, 1839 ; Clarke in Hk.f., Fl.Br.Ind. 4 : 390, 1884 (excl. syn. Malay.) ; Lindau in Engl. Bot. Jahrb. 17, Beibl. 41 : 38, 1893 ; Cooke, Fl.Press. Bomb. 2 : 342 ; Merill, Enum. Phil. Fl.Pl. 3 : 468, 1923 ; Bremekamp in Rec. Trav. Bot. Neerl. 35 : 142, t.130, 1938 ; Bor & Raizada in Journ. Bomb. Nat. Hist. Soc. 42 : 690, f.4, 1941.

Graham, *loc. cit.*, remarks: " Flowers large, pure white, but without any fragrance... The plant here referred to agrees well with Roxburgh's figure, but Mr. Law thinks it is a new species, as the flowers have no fragrance." Towards the end of the rains the plant is very common all along the line of the Western Ghats, especially in Khandala, where it is very abundant ; I have yet to discover the fragrance implied in the name of this plant.

There are two sizes of flowers, at least in Khandala, the larger up to 8 cms. diam., the smaller about 4—5 cms., the fruits too being proportionately sized ; I am not satisfied about these clear differences, perhaps we are dealing with two different varieties, but this point requires further investigation.

The structure of the corolla varies considerably ; generally the lobes are more or less rounded and entire at the apex, and two of them broader than the other three ; in the field I have often noticed flowers with but 4 lobes, which were practically regular and at the apex

they were either rounded as usual or more often subtruncate and somewhat deeply crenate.

In all the references consulted I find that the flowers are given as axillary, solitary or two together ; lately I have examined a good number of plants in Khandala and found that flowers are indeed axillary, but that as many as 5 may come out of the same axil in succession ; normally one flower may be seen open, the second in bud ready to open, the rest showing but the merest initials ; all these flowers come out in an orderly fashion and in one plane, the scars of the pedicels being noticeable even in rather old plants.

The best time for flowering seems to be immediately after the monsoon ; as for the fruits, it is at times difficult to find complete ones, as there seems to be an insect that has a particular attraction for them.

The plant is common in Khandala, Purandhar, Kaneri, and other places in Bombay State which I have examined.

2. **Thunbergia mysorensis** (Wight) T. Anders. in Journ. Linn. Soc. 9: 448, 1867 ; Clarke 393 ; Lindau 42 ; Cooke, 342 ; Gamble Flor. Madr. Pres. 1008.

Hexacentris mysorensis Wight, Icon. 3 : 6, t.871, 1844-1845 ; Bot. Mag. t.4786 ; Dalz. & Gibs., Bomb. Fl. 183, 1861.

The plate in Bot. Mag. shows the flowers to be bright yellow. I have not seen this plant in nature. The specimens in Kew Herbarium show that the plant is very similar to *T. fragrans* in structure except for the base of the leaves which is rounded or acute, not lanceolate as in *T. fragrans*.

3. **Thunbergia grandiflora** (Roxb. ex Rottl.) Roxb., Hort. Beng. 45, 1814 & Fl. Ind. 3 : 34, 1832 ; Graham, 163 ; Wight, Icon. t.872 ; Dalz. & Gibs., Suppl. 70 ; T. Anders. 447 ; Clarke, 392 ; Lindau 39 & in Engl. & Prantl. Pflanzenfam. 4(3B): f. 116N ; Merrill, 469 ; Bremek. 145, f.2, & t. 13D ; Bor & Raizada 693, t. 8A.

Flemingia grandiflora Rozb., ex Rottl. in Ges. Naturf. f. Neue Schr. 4 : 202, 1803.

A large climber with long racemes of large bluish flowers, often planted in gardens and occasionally running wild in Western India. In general appearance it is very similar to *Meyenia hawtayneana* Nees, but considerably larger in all its parts.

4. **Thunbergia alata** Boj. ex Sims. in Bot. Mag. t. 2591, 1825 ; Clarke 391 ; Dalz. & Gibs., Suppl. 71 ; Lindau in Engl. Bot. Jahrb. 17, Beibl. 41 : 40, 1893 ; Cooke, 343, Merrill 468 ; Bremek. 142, t. 13E, Bor. & Raizada 689, f.3.

Very similar to *T. fragrans* in general appearance but easely distinguishable on account of the winged petioles and yellow flowers. The leaves are smaller and relatively broader and more hairy on both sides than those of *Th. fragrans*. I have not seen the plant in the wild state in Western India ; in Blatt. Herb. there are but two sheets from Bombay: Sedg. 3067 from Belgaum, and Acland 919 from Kolhapur.

5. **Thunbergia erecta** (Benth.) T. Anders. in Journ. Linn. Soc. 7: 18, 1864 ; Lindau 41 ; Cooke, 343 ; Merrill 468 ; Bremek. 142, t.13B ; Bor. & Raizada 691, f.5 & t. opp. p. 692.
Meyenia erecta Benth. in Hook. Niger Fl. 476, 1849 ; Bot. Mag. t. 4013, 1857.

As stated in the key, this is an erect shrub, native of tropical Africa ; it has white or purple flowers. I have not seen the plant alive.

2. MEYENIA Nees.

1. **Meyenia hawtayneana** (Wall.) Nees in Wall., Pl. As. Rar. 3: 78. 1832 & in D.C., Prodr., 11 : 60, 1847 ; Wight, Icon. t. 1487 ; Cooke, 344 ; Gamble, 1009.
Thunbergia hawtayneana Wall., Tent. Fl. Nap. 49 in Obs., 1826 ; Paxton's Mag. 6 : 147, 1839 ; Clarke, 391.
Th. Hawtaynii T. Anders. in Journ. Linn. Soc. 9 : 448, 1867.
Meyenia Hawtaynii Lindau in Engl. & Prantl, Pflanzenfam. 4(3B) : 293, f.111H.

A monotypic genus, very similar to *T. fragrans* Roxb., from which it differs by its leaves, which are sessile, ovate, entire, and by its flowers, which are purplish blue. In general this plant is so near the genus *Thunbergia* that Clarke and other authors unite the two genera under one ; Lindau, *loc. cit.*, keeps them separate, the main differences being the more or less regularly 5-lobed calyx and the cog-wheel-shaped pollen in *Meyenia* as against the many-toothed calyx and furrowed pollen of *Tunbergia*. I am inclined to keep them separate mainly on account of the pollen structure, a feature of the *Acanthaceæ* to which recent authors seem to pay great attention.

In Blatt. Herb. there is but one sheet of this plant collected by *T. R. D. Bell* in Coorg, May 1918 ; except for the character of the flowers, this specimen might be taken for one of the *Asclepiadaceæ*.

3. ELYTRARIA L. C. Rich.

Elytraria Rich. in Mich., Fl. Bor. Amer. 1 : 8, 1803 is several years posterior to *Tubiflora* Gmel. (1791), but the former name is given as " nomen conservandum " in the latest edit. of the Internat. Rules of Bot. Nomencl.

Elytraria acaulis (Linn.f.) Lindau in Engl. & Prantl, Pflanzenfam. Nachtr. 1 : 304, 1897 ; Druce in Rep. Bot. Exch. Club Brit. Isl. 1916 : 621, 1917 ; Gamble, 1009.

Justicia acaulis Linn.f., Suppl. 84, 1781 ; Roxb., Pl. Cor. 2: t. 127, 1897.

Tubiflora acaulis O. Kuntze, Rev. Gen. Pl. 500, 1891 ; Lindau *op. cit.* 4(3B) : 289 ; Cooke, 345.

This is a plant remarkable for its appearance which is so different from the rest of the *Acanthaceæ* of Bombay. The stem consists of a stout, short, rhizome-like structure, 1—4 cms. long, with many slender, wiry roots ; the leaves are radical, up to 25 × 9 cms., spathulate or nearly so, decurrent into a petiole which is up to 8 cms. long. Flowers in slender radical scapes, which are as long as or a little longer than the leaves and usually simple. I have not seen the flowers.

On October 19, 1945 I found a large patch of this species under the shade of several Mango trees near Jamnagar in Saurashtra ; these plants were so dense as to leave no room for any other plant ; leaves were mostly flat on the ground, covering practically the whole area, the scapes were erect.

In Blatt. Herb. I have examined a number of sheets from the northern parts of Bombay: *Saxton* 1086 ! from Modasa ; *Saxton* 1732 ! from Ahmedabad, where it is said to be common ; my own specimens come from Jamnagar (*Santapau* 7616, 7617) and Barda Hills (*Santapau* 7897) ; *G. L. Shah,* Baroda, April 1950 !

4. NELSONIA R.Br.

Nelsonia campestris R.Br., Prodr. 481, 1810 ; Clarke, 394 ; Cooke, 345 ; Gamble 1010.

N. brunelloides O. Kuntze, Rev. 493, 1891 p.p. ; Lindau in Pfam. 4(3B): 289, f.110 C.
N. tomentosa Dietr., Sp. Pl. 1 : 419, 1831 ; Dalz. & Gibs., 183.

In general habits this species is similar to *Hygrophila serpyllum* Anders., and in the type of inflorescence to *Rungia elegans* Dalz. or *Neuracanthus trinervius* Wight, but the bracts are not so strongly nerved in the present species. As regards the name of this plant, Gamble remarks in Kew Bull. 1924, p. 238: "Lindau in the 'Natürlichen Pflanzenfamilien' gives *N. brunelloides* O. Kuntze as the oldest name for the plant usually known as *N. campestris* R.Br. I have, however, thought it better to follow Dr. Cooke and retain the name *N. campestris.* The picture by Lindau does not seem to me to represent the Indian plant, especially as regards the length of the spike, the size of the leaves, the anthers and, above all, the seeds."

O. Kuntze made his combination based on *Justicia brunelloides* Lamk., Illustr. Gen. 1 : 40, 1791 ; as Bremekamp has shown (Mat. Mon. Strob. 90), the Lamarckian type belongs to quite a different plant, which Bremek. has called *Hemigraphis brunelloides ;* it follows, therefore, that the oldest name available for this plant, irrespective of the identity of Lindau's species, is still *N. campestris* R.Br.

There seem to be two types of this species depending on the season of its growth ; during the rainy season the leaves reach 9×4 cms. and are either glabrous or nearly so ; in the dry part of the year leaves are only about $1.5 \times .1$ cm. and are more or less densely hairy with long, soft hairs.

To the specimens mentioned by Cooke, add the following from Blatt. Herb.: *Sedgwick,* forest near Yellapur, 244 ! *Bell* Ainshi, N. Kanara, 3884 ! and Devikop, Dharwar Dt., 5785 !

5. STAUROGYNE Wall.

Bentham and Hooker, Gen. Plant. 2 : 1074, give the name *Ebermaiera* Nees as the correct name for this genus, their reason being that although *Staurogyne* Wall. is somewhat older, it applies to but one species. O. Kuntze remarks that such a procedure is clearly against the rules of priority. C. B. Clarke in a MS. note in his own copy of Benth. and Hook., Gen. Plant., adds: "*Staurogyne* Wall. is, as Bentham here says, nomen antiquius ; also as Bentham says, Wallich's figure shows the style-branches wrong. But *Staurogyne* Wallich is equivalent to *Embermaiera* of Bentham while *Ebermaiera* Nees is not equivalent."

For a key to the species, see Cooke p. 346.

1. **Staurogyne glauca** (Nees) O. Kuntze, Rev. Gen. Pl. 497, 1891 ; Cooke, 346 ; Gamble, 1011.
Ebermaiera glauca Nees in DC., Prodr. 11 : 73, 1747 ; Clarke, 395 ; Wight, Icon. t. 1488 ; Dalz. & Gibs., 184.
A rare plant in Bombay ; after leaf-fall, the plant looks like *Justicia simplex* or *J. procumbens*, but the spikes are not so dense ; the leaves are up to 5 cms. long and spathulate.

2. **Staurogyne zeylanica** (Nees) O. Kuntze, Rev. 497, 1891 ; Cooke, 347 ; Gamble, 1011.
Ebermaiera zeylanica Nees, *loc. cit.* 74 ; Clarke, 397.
Erythracanthus elongatus Dalz. & Gibs., Bomb. Fl. 174, 1761 (non Nees).

The plants considered as types in Kew Herb. are two sheets, one from Ceylon by Thwaites, the other from Bombay by Dalzell. Both sheets, together with other specimens from Ceylon and Bomay, show that the plant is not only pubescent but also glandular hairy ; the spikes are slightly larger than in *S. glauca* O. Ktze. The short stem and procumbent habit, and the structure of the leaves at once separate this species from *S. glauca.*

6. CARDANTHERA Voigt.

C. B. Clarke in a MS note in Kew Herb. writes: "*Cardanthera* Voigt...is older than *Synnema.* Buch.-Hamilton's genus was *Cardianthera.*" Clarke gives no reference for the last part of his statement ; I have been unable to trace it. Blatter in 1930 described a new species of *Cardanthera ;* the differences between the two species are as follows:

Erect plants ; stamens 4 ; seeds 40—100 ... ... *pinnatifida.*

Procumbent and screeping plants ; stamen 1, staminode 1 ; seeds 10—12 ... ... *anomala.*

1 **Cardanthera pinnatifida** (Dalz.) Clarke in Hook. f., Fl.Br.Ind. 4 : 405, 1884 ; Cooke, 347 ; Gamble, 1012.
Nomaphila pinnatifida Dalz. in Kew Journ. Bot. 3 : 38, 1851 ; Dalz. & Gibs., 184 ; Hook. Icon. t. 843.

Adenosma pinnatifida T. Anders. in Journ. Linn. Soc. 9 : 455, 1867. *Synnema pinnatifidum* O. Ktze., Rev 500, 1891 ; Lindau in Pfam. 4(3B) : 295, 1895.

The leaf is the most typical part of this plant and is unique among the *Acanthaceæ* of Bombay in being pinnatifid ; when, however, the leaves are small, they may appear simply dentate or serrate, and the structure of the leaf can scarcely be used for the identification of the plant.

2. **Cardanthera anomala** Blatt. in Journ. As. Soc. Beng. 26 : 350, 1930.

" An Acanthaceous plant belonging to the tribe *Ruellieæ*, subtribe *Polyspermæ*. It differs from all the species of *Cardanthera* in having only one fertile stamen and one staminode, and only 10-12 seeds supported on curved retinacula." (Blatt., l.c., transl.).

If the generic characters given by Benth. and Hook. in Gen. Pl. 2 : 1074—1075, be strictly adhered to, this new species clearly falls into a new genus. Blatter himself says: " I have put this species under *Cardanthera* for want of a better place. Prof. Hallberg who found this plant, was in favour of making a new genus. I do not feel very confident about this proposal, especially as the new species seems to be a very variable one in other parts, constant regarding the stamen...The fact that another very anomalous species (*Cardanthera Thwaitesii* Benth. has already been put under *Cardanthera* by C.B. Clarke, has encouraged me to do the same with the new species."

In the absence of the actual type specimens, I feel very diffident about altering Blatter's name, although at the same time I am inclined to agree with Hallberg that the plant has been put in the wrong genus.

The only localities from which the plant has been collected are Vehar Lake, Salsette Isl. (*Hallberg* 9766), Tardeo, Bombay Isl. (*Hallberg* 9767) and Khandala on the Western Ghats ; none of these sheets can be traced in Blatt. Herb.

7. BLEPHARIS Juss.

For a key to the genus, see Cooke, 348.

1. **Blepharis asperrima** Nees, in DC., Prodr. 11 : 267, 1847 ; Clarke, 478 ; Dalz. & Gibs., 192 ; Wight, Icon. t. 1534 ; Cooke, 349 ; Gamble, 1013.

In my Flora of Khandala, soon to be published, I have noted of this plant: "Stems pale and glossy, irregularly striate, with a few scattered jointed hairs along the internodes, fairly densely hairy at the nodes; lower part of the stem often woody, especially during the summer months. Generally the stem is prostrate or procumbent; on Dec. 30, 1948 I found a clump of these plants in dense jungle with an entirely erect stem reaching nearly 1 m. in ht. Leaves up to 11.5 × 4 cms., rather large in the monsoon and post-monsoon periods, much smaller in the drier months; margins spinous-dentate with stiff hairs all along. Flowers bright blue, throat and tube white; very rarely the whole flower is uniformly white. All bracteoles and calyx segments ciliate with white, jointed hairs. A common herb in the under-growth of the forest or on grassy banks; abundant and gregarious."

In addition to the specimens from Khandala, I find the following sheets in Blatt. Herb.; *Sedgwick,* Arbail Ghat, N. Kanara, Nov. 1917, 3132 ! Karwar, Oct. 1919, 6507 ! *Hallberg* and *McCann,* Hattikere, N. Kanara, Oct. 1919, 34304 ! *Acland,* Dapoli, Oct. 1922, 884 ! *McCann,* Igatpuri, Oct.-Nov. 1917, 23030 ! In Blatt. Herb. without collector's name presumably Blatt., Uran, Jan. 1917, 14841 ! Panchgani 22680 ! Pen, Colaba Dt., Febr. 1917, 22818 ! Mulgaon, Salsette Isl., Dec. 1916, 23105 ! Kaneri Caves, Nov. 1918, 28882 ! In my field diaries I find this plant entered from Kaneri Caves, Parsik Hill, Andheri, Purandhar, etc. It is very abundant in Khandala.

2. **Blepharis maderaspatensis** (Linn.) Roth, Nov. Pl. Spl. 320, 1821 ; Bremek. in Verh. Nederl. Akad. Wet. (II) 45(2) : 10, 1948.
Acanthus maderaspatensis Linn., Sp. Pl. 892, 1753.
Blepharis boerhaviæfolia Pers., Syn. Pl. 2 : 180, 1806 ; Clarke, 478 ; Graham, 160 ; Dalz. & Gibs., 192 ; Wight, Icon. t. 458 ; Cooke, 349 ; Gamble, 1013 ; Benoist in Leconte, Fl. Gen. Indoch. 4 : 695, f.76(1—2).

In the structure of the leaves it approches *B. asperrima,* in that of the inflorescence, *B. molluginifolia.* Not quite as common as the preceding species, at least in the southern parts of Bombay; in Kathiawar, where it is rather common, it seems to replace *B. asperrima;* it is also common in the drier parts of the Deccan in open country; it is a prostrate plant with petiolate leaves.

Sedgwick, Dharwar, Dec. 1916, 1933 ! *Santapau,* Jamnagar, Oct. 1945, 7596 ! 7597 ! Barda Hills, 7879 ! *Blatt. Herb.,* Walkeshwar, Bombay, Dec. 1915, 14843 ! Makim, 14858 ! Surat, 23844 ! In addition I have found this plant in several open places in Bombay and Salsette Islands, at Mumbra, Purandhar, etc.

3. **Blepharis molluginifolia** Pers., Syn. Pl. 2 : 180, 1806 ; Clarke, 479 ; Graham, 160 ; Dalz. & Gibs., 192 ; Cooke, 349 ; Gamble, 1013.

The typical part of this plant are the leaves, which are long and narrow, up to 1.5 × 0.2—0.6 cms. ; it is also prostrate, as the preceding species, and seems to be less common.

Sedgwick, Dharwar Dt., Dec. 1916, 1924 ! Nov. 1916, 2166 ! *Vakil,* Bandra, seashore, Jan. 1919, 31214 ! *Blatt. Herb.* Kernalie, Gujerat, Nov. 1890, 23845 !

4. **Blepharis sindica** T. Anders., in Journ. Linn. Soc. 9 : 500, 1867 ; Clarke, 479 ; Lindau, 318 ; Cooke, 350.
Acanthodium grossum Wight, Icon. tt. 1535 & 1536 (non Nees).

In Blatt. Herb. there are a number of specimens of this plant from Sind and Baluchistan ; I have myself collected it in Cutch and Saurashtra ; the plant is doubtfully indigenous within the present limits of Bombay State. When growing in good localities, this plant is rather attractive, or, one might say, bizarre-looking, with very large spikes that make it quite different in appearance from any other Acanthaceous plant. Flowers are bright blue.

Clarke in MS. in Kew Herb. states that probably this plant is identical with the African *B. linearifolia* Pers. ; examination of large numbers of specimens has convinced Clarke that there is great variation in both the Indian and the African species, the only part that is uniform being the " singular bracteoles." Cooke, following T. Anders., considers the two species different, mainly on account of the structure of the corolla.

8. ACANTHUS Linn.

Acanthus ilicifolius Linn., Sp. Pl. 639, 1753 ; Clarke, 481 ; Graham, 159 ; Lindau, 319 ; Cooke, 351 ; Merrill, Enum. 480 ; Gamble, 1014 ; Merrill, Pl. Life Pac. World, 53, f. 64.
Dilivaria ilicifolia Juss., Gen. 103, 1789 ; Wight, Icon. t. 459 ; Dalz. & Gibs., 192.

A very common plant along the banks of tidal creeks and streams in Bombay and Salsette and elsewhere. It is a gregarious plant, often growing just inside the high water mark ; stems are unbranched and armed with strong thorns at the nodes. These thorns do not represent stipules, which are not present in the family, but the lowest segments or serratures of the leaf ; after leaf-fall, the two lowest thorns

may remain on the stem at the bare nodes, and make handling of the plant rather hazardous. Flowers are large and of a bright blue colour, but they usually come out in small numbers at a time, so that the plant generally has a rather wild look.

Blatt. Herb., Versova, June 1917, 29591 ! Sion, July 1917, 14861 ! *Vakil,* Kurla, May 1919, 31099 ! *D'Almeida,* Ghodbunder, March 1941, 152/4 ! *Santapau,* Versova creek, May 1941, 152/72 ! April 1942, 152/6 ! In addition I have recently noted the plant in Bassein near the Fort, at Ghodbundar, Mumbra, etc.

9. ASTERACANTHA Nees.

Linnæus placed this plant among the Barlerias, and in this was followed by Willdenow ; in Wight's herbarium there is a sheet identified as *Barleria tomentosa* Wight. Nees in 1832 separated the plant from *Barleria* and erected it into a new genus, *Asteracantha,* which was not accepted by T. Anders., who merely treated the new generic name as a section of *Hygrophila ;* Bentham and Hooker in Genera Plantarum and Clarke in Hook.f., Fl.Brit.Ind., follow Anderson. Lindau in Engl. and Prantl, Pfam. once more separated *Asteracantha* from *Hygrophila* and treated it as a monotypic genus ; most modern authors, among them Cooke, follow Lindau in keeping *Asteracantha* as a separate genus.

At first sight the plant, *Asteracantha longifolia,* looks quite different from the commoner species of *Hygrophila,* i.e. *H. Serpyllum* and *H. polysperma ;* on the other hand it is quite similar to *H. salicifolia* and *H. quadrivalvis,* from which it differs mainly on account of the presence of the axillary spines, which are not found in the species of *Hygrophila.* These five plants, *Asteracantha* and the four Hygrophilas, form a gradual series, with *H. Serpyllum* and *Asterac. longifolia* as the two extremes, with *H. salicifolia* and *H. quadrivalvis* as the connecting links between them. The spines of *Asteracantha,* however, are so distinctive that I am of opinion that the plant ought to be retained as a separate genus.

For a study of the morphology of the spines, see Kundu in Journ. Bombay Nat. Hist. Soc. 43 : 678—680, t.l. 1943.

Asteracantha longifolia (Linn.) Nees, in Wall., Pl. As. Rar. 3 : 90, 1832 & in DC. Prodr. 11 : 247, 1847 ; Wight, Icon. t. 449 ; Dalz. & Gibs., 189 ; Lindau, 297 ; Cooke, 352 ; Gamble, 1015.

Barleria longifolia Linn., Cent. Pl. II : 22, 1755 & Amoen. Acad. 4 : 320, 1759 ; Willd., Sp. Pl. 3(1) : 373, 1801 ; Graham, 161.
Ruellia longifolia Roxb., Fl. Ind. 3 : 50, 1832.
Hygrophila spinosa T. Anders., in Thw., Enum. 225, 1860 and in Journ. Linn. Soc. 7 : 22, 1864 ; Clarke, 408.

A rank and stout herb of little beauty except when growing vigourously in dense clumps. Axillary spines are stout, yellow and very sharp, persisting after leaf fall. Flowers bright blue to bluish purple, a fine sight when growing in crowded conditions. Common in fresh water ditches and swamps. After these have dried up and the leaves fallen, this plant is a real eye-sore.

In addition to Khandala plants, I have examined the following specimens in Blatter Herb. : *Vakil* Bandra, rice-fields, Nov. 1919, 31253 ! *Ezekiel,* Alibag, rice fields, 30334 ! *Kulp,* Purandhar, Sept. 1945, 8403 ! *Santapau,* Karjat, April 1941, 152/7 ! Dec. 1942, 1382 ! Dec. 1948, 9657 ! Tungar Hill at sea-level, Sept. 1941, 152/25 ! Jogeshwari, Oct. 1941, 152/33 ! *Blatt. Herb.* without collector's name, Matunga, Bombay, Sept.-Nov. 1915 and 1916, 14787 ! 14844 ! 14899 ! 14901 ! 14911 ! 14914 ! Condita, Salsette Isl., Dec. 1916, 23109 ! Dadgaon, Khandesh, Dec. 1918, 27257 ! Dangs Forest, Dec. 1918, 29601 ! I have recorded this plant from practically every district around Bombay which I have explored in the last ten years.

10. HYGROPHILA R.Br.

Key to the Hygrophilas of Bombay :

Procumbent herbs, flowers in terminal spikes, leaves small :

Stamens 2 fertile, seeds 20 or more ... ... *polysperma.*

Stamens 4 fertile, seeds 8—10, rarely more ... ... *serpyllum.*

Erect herbs, leaves rather large:

Flowers in terminal spikes ... ... *stocksii.*

Flowers axillary, whorled:

Bracteoles obtuse, oblong ; leaves obovate or linear-lanceolate ... ... *salicifolia.*

Bracteoles obtuse, oblong ; leaves obovate or elliptic ... ... *quadrivalvis.*

1. **Hygrophila polysperma** (Roxb.) T. Anders., in Journ. Linn. Soc. 9 : 456, 1867 ; Clarke, 406 ; Cooke, 353 ; Gamble, 1015.
Justicia polysperma Roxb., Hort. Beng. 3, 1814 & in Fl. Ind. 1 : 119, 1832 ; Wall., Cat. 2483.
Hemiadelphis polysperma Nees in Wall., Pl. As. Rar. 3 : 80, 1832 ; Wight, Icon. t. 1492.

Generally the flowers are blue or bluish purple ; occasionally in Khandala I have found them pure white. In general appearance this plant is almost undistinguishable from the following species ; it is only by dissection and examination of the number of stamens and seeds that they can be separated from each other. In Khandala I have found both species growing side by side on the banks of the village talao, both forming dense mats on the ground, but keeping more or less separate from each other.

Acland, Pawai lake, Salsette Isl., Jan. 1926, 917 ! *Santapau,* Borivli to Kaneri Caves, Jan. 1941, 152/60 ! *Blatt. Herb.*, Kathiawar 23834 ! In Khandala I have collected it on numerous occasions, but such specimens are listed elsewhere.

2. **Hygrophila serpyllum** (Nees) T. Anders. in Journ. Linn. Soc. 9 : 456, 1867 ; Clarke, 406 ; Kuntze, Rev. 491 ; Cooke, 354 ; Gamble, 1016.
Physichilus serpyllum Nees in Hook. Comp. Bot. Mag. 2 : 311, 1837 ; Dalz. & Gibs., 184 ; Wight, Icon. t. 1493.

A very common plant in Khandala, covering large patches in rice-fields after the harvest ; occasionally found floating in water, the stems and leaves floating, the roots attached to the soil or to the rocks. Plants growing in water or in very wet fields are very different from the ordinary ones, in that the petioles are very long, at times up to 4.5 cms. long, and the blades are obtuse, rounded at the apex or even nearly orbicular ; in this they approach very nearly to the var. *hookeriana* C. B. Clarke ; often the same plant has two kinds of leaves, the lower ones being very long petioled, higher leaves being sessile or nearly so. For these reasons I have found it difficult in the field to distinguish the variety *hookeriana* from the typical plants.

Another variation which I have found in the field is that fairly often the colour of the flowers is pure white, occasionally white with a touch of pink on the outside ; most of the fruits found on white-flowered plants had 12 seeds, and the flowers and fruits seemed to be slightly larger than in the normal plants. This point requires further study, as it may serve as the basis for the erection of a new species.

Hygrophila serpyllum Anders., var. **hookeriana C. B. Clarke in** Hook.f., Fl.Brit.Ind. 4 : 407, 1884 ; Cooke, 354.

From the specimens mentioned by Cooke and from some of my own, this seems at first to be a good variety ; in the field, however, it is not easy to decide which is the typical and which the *hookeriana* varieties. The form of the leaves seems to vary with the environment, especially with the amount of water present on the surface of the soil. The leaves of var. *hookeriana* are orbicular or more often reniform, sessile or shortly petiolate. Among my own specimens there is one which has rounded or reniform leaves on one branch, and ovate, acute or subacute leaves in the rest of the branches.

In addition to my Khandala specimens, the following sheets have been examined in Blatt. Herb. : *Acland,* Lonavla, Nov. 1926, 895 ! *Vakil,* Bandra, April 1919, 31254 ! *Ezekiel,* Alibag, rice-fields, Febr. 1917, 30376 ! *Blatt. Herb.* Uran, Jan. 1917, 14832 ! *Santapau* Jogeshwari, March 1949, 9951 ! Borivli, August 1943, 2335 !

The two species, *H. serpyllum* and *H. polysperma* are often mixed together and require careful study, as many of their characters are rather similar. The main differences between them are the following:

1. *H. polysperma* is slightly more robust than *H. Serpyllum.*

2. The capsules of *polysperma* are larger, at times half as large again as those of *serpyllum.*

3. The capsule of *polysperma* has ten seeds per valve, that of *serpyllum* only 4-5 ; the apex of the first is formed by the union of the valves and the base of the style ; that of *serpyllum* has a clear ring between the apex of the valves and the base of the style.

4. Cooke mentions that the capsules of both species are glabrous ; this is not confirmed by the many specimens which I examined in Kew Herbarium ; all the capsules examined in Kew and Blatt. Herb. are pubescent or tomentose, at least in the upper half, and definitely the capsules are not glabrous.

5. Both species are procumbent and rooting at the lower nodes, sometimes at most of the nodes ; this is particularly noticeable in *H. serpyllum.* But under overcrowded conditions, both species may be erect or suberect ; at any rate, the flowering branches are erect in both species. The length of the spikes is a poor character, as it is difficult at times to determine where the spike begins in *H. serpyllum.*

3. **Hygrophila salicifolia** (Vahl) Nees in Wall., Pl. As. Rar. 3 : 81, 1832 ; Clarke, 407 ; Wight, Icon. t. 1490 ; Dalz. & Gibs., 184 ;

O. Kuntze, 490 ; Lindau, 297 ; Merrill, Enum, 470 ; Bremek. in Verh. Nederl Akad. Wet. (II) 45(2) : 13.

Ruellia salicifolia Vahl, Symb. 3 : 84, 1794 ; Willd., Sp. Pl. 3(1) : 374, 1801.

Hygrophila angustifolia Cooke, 354 ; Gamble, 1016 (non R.Br., sec. Lindau).

As stated above, this plant looks very similar to *Asteracantha longifolia,* but for the absence of the latter's axillary spines.

4. **Hygrophila quadrivalvis** (Buch.-Ham.) Nees in Wall., Pl. As. Rar. 3 : 80, 1832 ; & in DC., Prodr. 11 : 89, 1847 ; Clarke, 408 ; Gamble, 1016.

Ruellia quadrivalvis Buch.-Ham. in Trans. Linn. Soc. 14 : 291, 1824 ; Wall., Cat. 2374.

R. undulata Vahl, Symb. 3 : 82, 1794.

Hygrophila undulata Nees in Wall., Pl. As. Rar. 3 : 80 in Syn. ; O. Kuntze, Rev. 491 (non Blume).

Ruellia obovata Wight, Icon. t. 1489.

Vahl's name, *undulata,* is undoubtedly the oldest one for this plant, but the combination *Hygrophila undulata* as made by Nees (1832) is not legitimate, first because Nees only gave it among the synonymy of his *H. quadrivalvis,* and secondly because the name is preoccupied by an older homonym, that of Blume (1825-6) for quite a different plant.

This species is not mentioned by Cooke ; I include it on the strength of a sheet in Kew Herbarium labelled " Concan, Stocks." It seems to be a very rare plant, nevertheless I feel that it ought to be included among our Hygrophilas as it helps to make the perfect transitional series from the smaller and simpler Hygrophilas to *Asteracantha.*

The following description has been adapted from that given by Clarke, p. 408: Closely resembling *H. salicifolia ;* stems erect ; leaves lanceolate or elliptic, narrowed at both ends, glabrate, up to 10 × 4.5 cms. Flowers axillary, whorled ; bracteoles oblong, obtuse ; calyx gamosepalous often till long after flowering, divided one-third of the way down, lobes lanceolate. Capsule frequently 20 mm. long, much longer than the calyx segments, and stouter than in *H. salicifolia.*

5. **Hygrophila stocksii** T. Anders. ex C. B. Clarke, in Hook.f., Fl.Brit. Ind. 4 : 407, 1884.

Cooke excludes this plant on the ground that the " specimens on the single sheet in Kew Herbarium (*Physichilus* no. 4 in Herb. Hook. & Thoms.) are clearly nothing more than luxuriant forms of *H.*

serpyllum." With this I cannot agree, for the following reasons: 1) The habit of the plant is entirely erect, not procumbent and rooting; 2) The whole plant is 45—50 cms. high with a stout, straight stem; 3) The leaves are up to 9 × 3 cms. in size. The type of inflorescence, the size of the stamens, etc. are like those in *H. serpyllum;* but in my experience of ten years during which I have examined very large numbers of specimens of *H. serpyllum* I have not come across such an abnormal specimen nor anything approaching it; even when *H. serpyllum* assumes an erect or ascending habit, the size of the leaves and stems is practically constant. In my opinion, until a set of intermediate stages connecting *H. stocksii* with *H. serpyllum* appears, the specimen in Kew should be treated as a clear, separate species.

11. RUELLIA Linn.

The genus *Ruellia,* to judge from the species attributed to it by Linne in the first edit. of Species Plantarum, was a complex one, consisting of 5 American and 3 Asiatic species, of which *R. clandestina* and *R. tuberosa* are the only ones now left in the genus; moreover these two linnean names are now accepted as synonyms for the same plant, the one commonly known under the name of *R. tuberosa.* Taking *Ruellia* in the modern restricted sense, the genus in exclussively American with *R. tuberosa,* native of Central America, now spreading in India and other countries in S.E. Asia.

Nees erected the genus *Cryphiacanthus,* which in its original circumscription coincided with *Ruellia* in the modern restricted sense just described; in his monograph in DC., Prodr. vol. 11, however, Nees extended the limits of his new genus so as to include a number of non-American plants; his *Ruellia,* on the other hand, became a totally different genus, containing none of the species originally enumerated by Linne in Species Plantarum, and coinciding with *Hemigraphis* Nees emend. T. Anders.

The only species of *Ruellia* found wild or naturalised in Bombay is *R. tuberosa;* all the other species mentioned by Cooke or by Clarke under the genus *Ruellia* must be shifted to the genus *Dipteracanthus.* The differences between these two genera are here given after Bremekamp, loc. cit. 45(1) : 7-8:

Flowers in lax axillary cymes; the cymes sometimes combined in a large terminal panicle. Bracteoles always shorter than the calyx. Pollen grains always 3-porous. Species introduced from America.

Ruellia Linn., emend. Bremek.

Flowers never in lax axillary cymes ; flowers all axillary, not rarely two or three superposed or in axillary triads. Pollen grains sparsiporous. Asiatic species.

Dipteracanthus Nees, emend. Bremek.

Ruellia tuberosa Linn., Sp. Pl. 635, 1753 ; Bremek. in Verh. Ned. Akad. Wet. (II) 45(1) : 11, 1948.

An erect herb, 25—50 cms. high ; leaves ovate or elliptic, acute or subacute, tapering at the base and decurrent into a short petiole. Flowers in axillary cymes, up to 4 cms. diam., blue ; capsules up to 2.5 cms. long, more or less uniformly cylindric for most of their length.

This is an introduced plant that seems to be spreading in Bombay ; for several years I have observed it growing in great abundance along the sides of Cruickshank Road, Bombay, and in other parts of the island ; I have not seen it as yet truly wild away from the town or its suburbs. The flowers are pretty and quite attractive.

12. DIPTERACANTHUS Nees, emend. Bremek.

" Nees united in his genus *Dipteracanthus* all *Ruelliinæ* with axillary flowers and distinctly unguiculate capsules, but the genus is here restricted to those species which, in addition to these characters, are provided with large foliaceous bracteoles, a subringent corolla and sparsiporous pollen. The American species therefore are excluded. ...A remarkable phenomenon in the genus *Dipteracanthus* is the variability in the relief of the pollen grains: the latter are in some species alveolate, and in other tuberculate: in the latter the walls of the alveoles are suppressed, but the pillars by which the alveoles are strengthened at the corners are left. In other respects the differences between these species are so small that they are often difficult to distinguish..." Bremek., *loc. cit.* 45(1) : 15, 1948.

Following Bremekamp I have reverted to the genus *Dipteracanthus* and placed under it all the species of *Ruellia* mentioned in Cooke's Flora. It is interesting to note that C. B. Clarke in Fl. Brit. Ind. 4 : 411 and Cooke in his Flora somewhat inconsistently retain the genus *Ruellia* in the Linnean sense, but apply this name only to the species of *Ruellia* Linn. sect. *Dipteracanthus* of Benth. & Hook. in Gen. Plant.

Kep to the species of Dipteracanthus of Bombay (adapted from Cooke under *Ruellia*):

Leaves ovate or ellictic:
Prostrate or climbing ; leaves sparsely hairy, acute ; ovary and capsule pubescent ... ... *prostratus.*
Suberect or erect ; leaves closely pubescent on both sides, obtuse ; ovary and capsule glabrous ... ... *patulus.*
Leaves linear, hoary ; ovary and capsule pubescent *longifolius.*

1. **Dipteracanthus prostratus** (Poir.) Nees in Wall., Pl. As. Rar. 3 : 81, 1832 & DC., Prodr. 11 : 124, 1847 ; Bremek. *loc. ult. cit.* 16.
Ruellia prostrata Poir. in Lamk., Encycl. 6 : 349, 1804 ; T. Anders. in Journ. Linn. Soc. 7 : 24, 1864 ; Clarke, 411 ; Gamble, 1017.
Diperacanthus dejectus Nees, *ibid.* 82 & 125 ; Dalz. & Gibs., 185.
Ruellia prostrata Poir. var. *dejecta* Clarke in Fl.Brit.Ind. 4 : 412, 1884 ; Cooke, 355.
R. ringens & *R. deccanensis* Graham, Cat. 162, 1839.

There are no specimens of the typical *R. prostrata* in Kew Herb. from India ; I have followed Bremekamp in reducing the var. *dejecta* to the typical plant ; "the difference between *D. prostratus* and *D. dejectus* has been described in such vague terms that it seems impossible to maintain the latter even as a variety." (Bremek. *loc. cit.* 17).

In Blatt. Herb. I have examined two sheets of this species: *Acland,* Ahmednagar, 931 ! Matunga, Sept. 1925, 903 !

2. **Dipteracanthus patulus** (Jacq.) Nees in Wall., Pl. As. Rar. 3 : 82, 1832 ; Wight, Icon. t. 1505.
Ruellia patula Jacq., Misc. Bot. 2 : 358, 1781 ; Clarke, 412 ; Graham, 162 ; Lindau, 319, f.124 E-F ; Cooke, 356 ; Gamble, 1017.
Petalidium patulum Dalz. & Gibs., Bomb. Fl. 185, 1861.

Judging from the specimens in Kew Herb., this seems to be more common in Sind than in the moister parts of Bombay ; some of the specimens have leaves that are almost orbicular.

The following sheets are to be found in Blatter Herb.: *Acland,* Poona, July 1917, 930 ! *Ticehurst,* Karachi, Aug. 1919, 28136 ! *Santapau,* Nawanagar State, Oct. 1945, 7600 ! 7888 ! 7780 ! 7627 ! 7639 ! 7644 ! *Blatt. Herb.* Poona, June 1889, 23831 ! Mount Abu, Sept. 1916, 2240 !

3. **Dipteracanthus longifolius** Stocks in Kew Journ. Bot. 4 : 177, 1852.
Ruellia longifolia (Stocks) T. Anders. in Journ. Linn. Soc. 9 : 460, 1867 ; Clarke, 412 ; Cooke, 356.

This is a plant typical of very dry or almost arid situations, with woody, very twiggy stems, and long, narrow leaves, the whole plant being hoary with glandular pubescence.

For a plant systematist the most interesting part about this plant is the complicated nomenclature under the name *Ruellia ;* T. Anderson in 1867 made his new combination based on Stocks' name, but apparently he was in ignorance of the numerous previous homonyms that had been given to several different plants ; T. Anderson's *Ruellia longifolia* (1867) is not the same as that of Richard (1792), nor that of Roth (1821), nor that of Roxb. (1832), nor that of Thunb. ex Nees (1847), nor that of Anderson himself (1864) ; Grisebach ex Lindau in Pflanzenfamilien has added to the confusion by again using the same epithet for a different plant in 1895.

13. HEMIGRAPHIS Nees.

Bremekamp in his Mat. Mon. Strob. (1944) has treated the genus *Hemigraphis* in such a way that some of the hitherto recognised species have been removed to several different genera. The position of the Indian species of *Hemigraphis* in Bremekamp's new scheme is apparent from the following extract from his book (pp. 36—37):

" The next genus to be considered is *Hemigraphis*. That the latter is not really distinct from *Ruellia* sensu Nees, was first recognized by Anderson and it was he who transferred the bulk of the *Ruellia* species enumerated by Nees to *Hemigraphis ;* the name *Ruellia* could no longer be used for this genus, as it did not comprise *R. tuberosa,* the species on which it had been founded by Linne. ...Apart from the plurilocular ovary cells and the 5-fid calyx, the most distinctive features of the genus are the herbaceous habit, the spiciform inflorescences composed of solitary or superposed flowers, the small, either blue, violet-tinged or nearly white, non-resupinate corolla, the obtuse or slightly apiculate anthers, and the small areola at the base of the seed. It is the largest and most widely spread genus of the whole subtribe, for its more than sixty species cover an area extending from the Indian Peninsula to Melanesia, *i.e.* Ceylon in the south and the mountainous and colder regions in the north excepted, the whole area where representatives of this subtribe are found. ...In contradistinction to most of the other genera, who prefer the shade of the mountain forests, the *Hemigraphis* species are plants growing in the hot plains."

And on p. 74: " Of the three genera included in group A, *Gantelbua* differs from *Hemigraphis* in the peculiar structure of the

inflorescence with its two kinds of bracts, whereas *Aechmanthera* is characterised by awned or mucronate anthers and completely exareolate seeds ; on the whole the difference between these three genera is but slight: *Aechmanthera* and *Gantelbua* may be regarded as aberrant members of the group, whereas the bulk of the species, those provided with the less striking characters, are brought together in *Hemigraphis* ... The small genus *Aechmanthera* is endemic in the Himalaya and the neighbouring mountains, and the monotypic *Gantelbua* in the Indian Peninsula."

The following is the translation of the main generic characters of *Hemigraphis* as conceived by Bremekamp and given in his Conspectus Generum, *op. cit.* p. 55: "*Hemigraphis* Nees, emend. T. Anders. Herbs. Inflorescence elongated or abbreviated. Flowers solitary in the axiles of bracts, or two or three superposed. Calyx 5-fid, or rarely 5-lobed. Anthers muticous or scarcely dinstinctly mucronulate. Seeds distinctly areolate, covered with annulate, at times with mucous, hairs. With the exception of Ceylon and the northern subtropical region, distributed throughout the whole area of the tribe ; absent from the more elevated districts.

For a key to the species of Hemigraphis, see Cooke p. 358.

1. **Hemigraphis latebrosa** Nees var. **heyneana** Bremek., Mat. Mon. Strob. 139, 1944.
   Hemigraphis latebrosa (Heyne ex Roth) Nees in DC., Prodr. 11 : 723, 1847 ; Clarke, 423 ; Wight, Icon. t. 1504 ; Cooke, 358.
   Ruellia latebrosa Heyne ex Roth, Nov. Pl. Sp. 307, 1821.
   Ruellia elegans Bot. Mag. t. 4489, 1835 ; Graham, 162 ; Dalz. & Gibs., 186.

This is the typical variety, as distinct from the var. *ebracteata* Cooke, and corresponds to the description of the species, (not the varieties) as given by Cooke, p. 358.

A fairly common plant on the Western Ghats, by the sides of paths or in open places in the forests. It is in flower and fruit throughout the cold season. The general appearance of the plant is very similar to *H. crossandra* Bremek. (*H. elegans* Nees), but differs in having capsules which are hairy and about three-quarters to two-thirds of the size of those of *H. crossandra ;* the number of seeds is only 6, whereas that of the latter species is 8—10. For the rest it is not easy to separate one plant from the other in herbarium specimens.

Hemigraphis latebrosa Nees, var. **ebracteata** (Dalz.) Cooke, in Fl.Pres. Bomb. 2 : 358, 1904 ; Bremek. 139.

Ruellia ebracteata Dalz. in Kew Journ. Bot. 2 : 342, 1850.
Hemigraphis ebracteolata Clarke in Hook.f., Fl.Brit.Ind. 4 : 424, 1884 (sphalm. pro "*ebracteata*").
Ruellia latebrosa Dalz. & Gibs., Bomb. Fl. 186, 1861.

"Hispid with scattered white hairs, leaves small, petioled, ovate, serrate, bracteoles 0, capsule $\frac{1}{3}$ in., 6-seeded." (Clarke, *loc. cit.*)

2. **Hemigraphis rupestris** Heyne ex T. Anders. in Journ. Linn. Soc. 9 : 462, 1867 ; Bremek. 141.
H. latebrosa var. *rupestris* C. B. Clarke, *loc. cit.*, 224 ; Cooke, 358.

I find it very difficult to distinguish between these three plants, *i.e. H. latebrosa* vars. *heyneana* and *ebracteata* and *H. rupestris*. In the herbarium they all seem very similar, and the size of the leaves, density of pubescence, etc. appear to depend on the season or locality of the collection rather than on specific differences. In Khandala and elsewhere in fairly moist spots I have often collected specimens with large leaves and soft, white pubescence, this form corresponding to the typical *H. latebrosa ;* from further inland in the Deccan or from Khandala itself in exposed situations especially during the hot season I have gathered plants or examined herbarium specimens that seem to belong to the other two varieties ; even the normal *H. latebrosa* after the fall of the larger leaves looks remarkably like the other plants.

3. **Hemigraphis crenata** (Benth.) Bremek., in Mat. Mon. Strob. 137, 1944.
Ruellia crenata Benth. ex Hohenack. in Flora 32 : 558, 1849.
R. elegans var. *crenata* C. B. Clarke in Fl.Brit. Ind. 4 : 425, 1884 ; Cooke, 359.

"...It can hardly be doubted that Clarke's reduction of *Ruellia crenata* Benth. to a mere variety of the species under discussion, is a mistake: the discontinuity of the areas in which these plants occur, makes their conspecificity highly improbable, and the description of *R. crenata* seems to exclude such a near affinity." (Bremek., 76—77).

Note.—Hemigraphis elegans Nees is an Indian plant, but has not been recorded from Bombay. For the sake, however, of those Indian botanists who may not have access to Bremekamp's papers, I insert the correct nomenclature as given by Bremekamp.

Hemigraphis crossandra (Steud.) Bremek., Mat. Mon. Strob. 137, 1944.
Ruellia crossandra Steud., Nomen. (ed. 2) 2 : 481, 1841.
Ruellia elegans Hook., Bot., Mag. t. 3389, 1835 (non Poir.)
Hemigraphis elegans Nees in DC., Prodr. 11 : 722, 1847.

Ruellia diffusa Wall., ex Nees in Wall., Pl. As. Rar. 3 : 83, 1832 (non Vellozo, Fl.Flum. 6 : t. 94, 1827).

" The introduction of the new combination *H. crossandra* requires a few words of explanation. The species to which it refers, was up to now known as *H. elegans* (Hook.) Nees, but this combination is illegitimate, for it dates from 1847, and at that time the plant was legitimately known as *Ruellia crossandra,* a name introduced by Steudel...because the name *R. elegans,* under which the plant had been described by Hooker...was invalidated by *R. elegans* Poir. ...An older name for the same species is *R. diffusa* Wall. ex Nees...but the epithet *diffusa* too is illegitimate, for it had already been used in the same combination by Vellozo...for a Brazillian plant. *Strobilanthes burmanica* Kurz is, according to Clarke, another synonym. As I did not see Kurz's specimen, I am unable to express an opinion on this identification." (Bremek., p. 76).

14. GANTELBUA Bremek.

The following is the translation of Bremekamp's generic characters as summarized in his Conspectus Generum, *op. cit.* p. 55 : " *Gantelbua* Bremek. Setose herbs. Inflorescence abbreviated, with an involucre of four large bracts, which are ovate, thick, the midrib and margin cartilaginous and setose, the lower bracts each subtending a flower and a superposed contracted secondary spike, the upper bracts each supporting one or two superposed flowers ; the bracts of secondary spikes narrower. Calyx 5-partite, anthers muticous ; seeds scarcely areolate, covered with annulate, mucous hairs. In the hotter parts of Peninsular India."

A monotypic genus, endemic in Peninsular India. " The genus *Gantelbua* was separated from *Hemigraphis* on account of the peculiar structure of the inflorescence, but it distinguishes itself also from that genus by the deeply divided calyx and by the small size of the areola. The name is a latinization of the vernacular name of the type species," the vernacular name, according to Cooke, p. 357, being *Gantelbu.*

Gantelbua urens (Heyne ex Roth) Bremekamp, Mat. Mon. Strob. 148, 1944.

Ruellia urens Heyne ex Roth, Nov. Pl. Sp. 302, 1821.

R. dura Nees in Hook., Comp. Bot. Mag. 2 : 311, 1836 & in DC., Prodr. 11 : 146, 1847 ; Dalz. & Gibs., 186.

Hemigraphis dura T. Anders., in Journ. Linn. Soc. 9 : 461, 1867 (excl. syn. *R. crispa* Nees non Linn.) ; Clarke, 422 ; Cooke, 357 ; Gamble, 1018.

The specimens of this species in Kew Herbarium show the plant to be hispid with stiff and fairly long hairs. There is a specimen in Kew Herb. collected by Haines at Khandala on 4th March 1911 ; the general title of Haines' labels and of this one in particular is " Flora of Central Provinces," and in consequence it seems probable that the name " Khandala " is a copyist mistake for " Khandwa " or such like name ; I have not been able to find any information about Haines' ever collecting in our Khandala, Poona Dt., nor do I find in any of the Atlases or Gazeteers available to me any place called Khandala in the Central Provinces.

To the specimens mentioned by Cooke, the following have to be added: *Woodrow*, Poona, May 1880, 369 ! 872 ! *Sedgwick*, Dharwar Dt., Jan. 1917, 2162 ! Febr. 1919, 5303 ! Without date, 27743 ! *Acland*, Ahmednagar, 905 !

15. PETALIDIUM Nees.

Petalidium barlerioides (Roth) Nees in Wall., Pl. As. Rar. 3 : 82, 1832 ; Clarke 416 ; Dalz. & Gibs., 185 ; Lindau, 299 & ff. 112 G, 120 J ; Cooke, 359 ; Gamble, 1021.
Ruellia barlerioides Roth., Nov. Pl. Sp. 310, 1821.
R. bracteata Roxb., Fl. Ind. 3 : 47, 1832 ; Graham, 172.

Cooke gives the distribution of this plant as " more or less throughout India." I have searched for it during ten years without success. In Blatt. Herb. I have examined the following sheets: *T. R. D. Bell*, Thana Dt., Febr. 1918, 3649 ! *Sedgwick*, Dharwar Dt., March 1919, 2394 ! *Acland*, Government House, Bombay, March 1933, 958 !

16. PHAULOPSIS Willd., emend. Spreng.

Phaulopsis Willd., Sp. Pl. 3 : 342, 1801, emend. Spreng in Anleit. (ed. 2) 1 : 422, 1817, is a " nomen conservandum ", against *Micranthus* Wendl., Bot. Beobacht. 38, 1798 (non Eckl. 1827). In some of the more recent works on Indian botany, the name *Micranthus* is used, possibly, as Gamble says, " having overlooked the fact that *Phaylopsis* had been admitted as a ' nomen conservandum '." Ecklon, Top. Verz. 43, 1827, gave the name *Micranthus* to a plant of the family Iridaceæ, which in consequence of the existence of the previous homonym of Wendland should be an illegitimate one. O. Kuntze gave the name

Paulomagnusia to the iridaceous plant and retained *Micranthus* Wendl. for the present genus. C. B. Clarke in a MS note in Kew Herb. states that the name *Micranthus* Ecklon (a subgenus in Pers., Syn. 1 : 46) belongs to the Iridaceæ, and that the name *Micranthus* Wendl. has in the meanwhile fallen into disuse for the Acanthaceæ ; Clarke ends his remarks thus: "Otto Kuntze has revived *Micranthus* for the Acanth. after the name had slept 91 years and after it had been employed for the Irid 64 years."

Phaulopsis dorsiflora (Retz.) Santapau in Kew Bull. 1948 : 276, 1948.
Ruellia imbricata Forsk., Fl. Aeg.-Arab. 113, 1775 ; Graham, 162
R. dorsiflora Retz., Obs. 6 : 31, 1791.
Micranthus oppositifolius Wendl., Bot. Beobacht. 39, 1798 ; Cooke, 360.
Phaulopsis (*Phaylopsis*) *parviflora* Willd., Sp. Pl. 3 : 342, 1801 ; Clarke, 417.
Aetheilema reniforme Nees in Wall., Pl. As. Rar. 3 : 94, 1832 ; Wight, Icon. t. 1533 ; Dalz. & Gibs., 192.
Phaulopsis imbricata Cordem. Fl. Reum. 496, 1895 (non Sweet 1827).
Phaulopsis oppositifolia Lindau in Pfam., Nachtr. 1 : 305, 1897.
Micranthus dorsiflorus Fischer, in Kew Bull. 1932 : 63, 1932.

The spelling of the generic name was corrected to *Phaulopsis* from *Phaylopsis* by Sprengel in *loc. cit.*, and the correction has been accepted by the latest edit. of the Intern. Rules Bot. Nomencl. As for the specific name, *Ph. imbricata* would be the oldest and correct name, but for the fact that this combination had already been used by Sweet in Hort. Brit. 327, 1827 to designate another plant. Moreover, the specific name has been corrected to the femining gender, the name as first used by Willdenow being feminine.

In general appearance this plant is very similar to *Hemigraphis latebrosa,* but is distinguished by the secund spikes and the broadly ovate or reniform bracts, and the fact that the bracts in this plant each supports usually three flowers ; in *Phaulopsis,* moreover, one of the calyx segments becomes enlarged and bract-like, whilst in *H. latebrosa* one of the segments is usually longer than the rest, but is not bract-like. Finally in *Hemigraphis* the number of seeds is 6—20, in *Phaulopsis* only 4 or occasionally fewer.

To the localities mentioned by Cooke, add the following : *Sedgwick* Anmod, N. Kanara, Dec. 1917, 3374 ! Kanankeri, Dharwar Dt. Febr. 1918, 3722 ! *Nana,* Castle Rock, March 1919, 5537 !

17. DYSCHORISTE Nees.

Dyschoriste Nees in Wall., Pl. As. Rar. 3 : 75, 1832 & in DC., Prodr. 11 : 106, 1847 ; Lindau in Pfam. 4(3B) : 302, 1895 ; Cooke, 361 ; Gamble, 1022. *Calophanes* Don, in Sweet, Brit. Fl. Gard., ser. 2, t.181, 1833 ; Clarke, 410.

In Kew Herbarium the name *Dyschoriste* Nees is not accepted for this genus, all the sheets being placed under *Calophanes ;* in this they follow Benth. & Hook. Gen. Pl. 2 : 1077. C. B. Clarke in 1884, in Hook., Fl.Brit.Ind. followed Benth. and Hook., but in 1900 in This.-Dyer, Fl.Trop.Afr. 5 : 72 changed over to *Dyschoriste ;* in Kew Herb. there is a MS. note by Clarke: "Dyschoriste is *one year* older. C. B. Clarke, Nov. 1896." It may appear strange that Index Kewensis, while acknowledging that *Dyschoriste* is " nomen prius," merely mentions it as a synonym of *Calophanes.*

For a key to the species of *Dyschoriste* from Bombay see Cooke, 361.

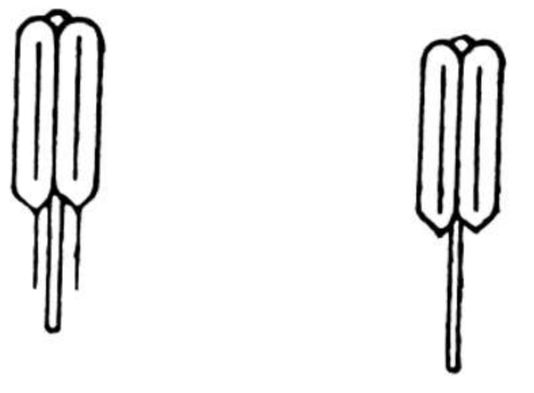
1. **Dyschoriste erecta** (Burm.) O. Kuntze, Rev. Gen. Pl. 485, 1891 ; Lindau, 302 (non Clarke, in This.-Dyer, Fl. Cap. 5 : 17, 1901).
   Ruellia erecta Burm., Fl.Ind. 135, t.41, f.3, 1768.
   Dyschoriste depressa Nees in Wall., Pl. As. Rar. 3 : 81, 1832 ; Clarke in This.-Dyer, Fl.Trop.Afr. 5 : 72, 1900 ; Cooke, 361 ; Gamble, 1023.
   Calophanes nagchana Nees in D.C., Prodr. 11 : 109, 1847 ; Clarke, 410.

To the specimens mentioned by Cooke, add the following from Blatt. Herb.: *Sedgwick,* Shiggaon, Dharwar Dt., May 1917, 2381 ! Yelvigi, August 1918, 4273 !

2. **Dyschoriste vagans** (Wight) O. Kuntze, Rev. 486, 1891 ; Lindau, *loc. cit. ;* Cooke, 362 ; Gamble, 1023.
   Calophanes vagans Wight, Icon. t. 1526, 1850 ; Clarke, 411.
   The following sheets are in Blatt. Herb.: *Sedgwick,* Hulkop, Dharwar Dt., Dec. 1917, 3173 ! Konankeri, Dharwar Dt., Dec. 1918, 4946 !

3. **Dyschoriste Dalzellii** (T. Anders.) O. Kuntze, Rev. 486, 1891 ; Lindau, *loc. cit.;* Cooke, 362.
   Calophanes Dalzellii T. Anders. ex Bedd., Icon. Pl. Ind. Orient. 1 : 60, t. 248, 1874 ; Clarke, 411.

This species is not very common in Bombay, but apparently less rare than the other species. *D. Dalzellii* is endemic in Bombay. The differences between this species and *D. vagans* are very minute, almost microscopic, nevertheless they are quite clear: in *D. vagans* the anther spurs are fairly long, from one quarter to one-third as long as the anther cells, whilst in *D. Dalzellii* they are either totally absent or are only represented by a minute point at the base of the anther cells. Diagrammatically :



D. VAGANS. D. DALZELLII.

D. Dalzellii seems to be fairly abundant at Purandhar, about the middle of the hill ; I have seen it growing several times just behind Vazirgadh Fort, to the N.E. of the hill. In Blatt. Herb. I have also examined a number of sheets collected by McCann in Dec. 1918—Jan. 1919 from the same locality.

18. ERANTHEMUM Linn.

This genus was established by Linne in Flora Zeylanica based on a Ceylon plant, to which later in Sp. Pl. 9, 1753, he gave the name of *Eranthemum capense,* apparently on the mistaken impression that the plant came from South Africa. Roxburgh used the name *Eranthemum* in the Linnean sense for a plant which he called *E. montanum,* which is identical with the Linnean plant, although Roxburgh seems to have been unaware of this fact.

The confusion in the use of the name *Eranthemum* dates from the publication of the revision of the Indian Acanthaceæ by T. Anderson in 1867. He had some time previously published the name *Dædalacanthus* based on a Ceylon plant, which Anderson knew to be the *Eranthemum montanum* of Roxburgh, but did not know the same plant to be the species on which Linne had based the genus *Eranthemum.* In his revision Anderson divided the genus *Eranthemum* and placed under *Dædalacanthus* all those plants allied to *D. montanus,* the rest he placed under *Eranthemum.*

Radlkofer in 1883 called attention to the fact that the genus *Dædalacanthus* T. Anders. was strictly synonymous with *Eranthemum* Linn. ; for the group of plants placed under *Eranthemum* T. Anders. Radlkofer proposed the name of *Pseuderanthemum,* the name *Dædalacanthus* T. Anders. being relegated to the synonymy of *Eranthemum* Linn. In recent books on Indian Botany, most authors have adhered to the unsuitable names of T. Anderson, possibly out of respect for Clarke and Hooker ; Gamble, however, in his Flora of Madras (p. 1025) has reverted to the Linneam *Eranthemum.* As regards the specific names, Gamble writes in Kew Bulletin 1924, p. 238: "I have thought it best to adhere to the latter specific name (*i.e. montanum* Roxb.), that of *capense* being so inappropriate." Whatever the fitness of a particular name, the Intern. Rules of Bot. Nomencl. leave no liberty for such changes of specific epithets, and in consequence the older Linnean name must be retained for the Indian plant.

The whole question of *Eranthemum, Dædalacanthus,* etc. has been discussed at some length by Radlkofer, O.Stapf, Gamble, etc., whose papers are referred to in the list of literature at the end of this paper.

Key to Eranthemum species of Bombay (adapted from Gamble):

Bracts white with green nerves ; calyx scarious:

Bracts elliptic-ovate, cuspidate, nearly glabrous ; spikes 2.5-7.5 cms. long, in close panicles ... ... *nervosum.*

Bracts obovate, obtuse, mucronate or shortly apiculate, gland-strigose ; spikes 7.5-15 cms. long, subinterrupted, in elongate panicles, often solitary ... ... *roseum.*

Bracts green, rarely whitish when old:

Bracts ovate-lanceolate, long acuminate, prominently many-nerved, white ciliate on the margins ; spikes 1.5-7.5 cms. long, dense, long-peduncled, forming loose panicles ; calyx scarious ... ... *purpurascens.*

Bracts lanceolate to linear, long-acuminate, few-nerved, viscidly gland-hispid ; spikes 5-15 cms. long, slender, often interrupted, in large, very compound terminal panicles ; calyx green, glandular ... ... *capense.*

1. **Eranthemum capense** Linn., Sp. Pl. 9, 1753.
E. montanum Roxb., Hort. Beng. 80, 1814 & Fl. Ind. 1 : 100, 1824 & 1 : 110, 1832 ; Hook. Bot. Mag. t. 4031 ; Gamble, 1025.
Justicia montana Roxb., Pl. Corom. 2 : t.176, 1798.
Dædalacanthus montanus T. Anders. in Thw., Enum. 229, 1869 ; Clarke, 421.

The typical species does not seem to have been recorded from Bombay ; there are no specimens in Kew Herb. or in any of the several collections in Blatt. Herbarium.

Eranthemum capense Linn. var. **concanensis** (T. Anders.) Santapau, comb. nov.

Dædalacanthus concanensis T. Anders. MS in T. Cooke, Fl.Pres.Bomb. 2 : 365, 1904.

D. montanus var. *concanensis* C. B. Clarke, in Fl.Brit.Ind. 4 : 421, 1884.

Eranthemum montanum Dalz. & Gibs., Bomb. Fl. 195, 1861 (non Roxb.)

A rare plant in Bombay ; clearly it differs from all other species of *Eranthemum* on account of its interrupted spikes ; the bracts are obtusely acuminate and considerably smaller than those of other Bombay species.

There is in Blatt. Herb. a sheet of this variety: *Sedgwick*, Yellapur, April 1919, 5852 !

2. **Eranthemum roseum** (Vahl) R.Br., Prodr. 477, 1810 ; Dalz. & Gibs., 195 ; Gamble, 1024.

Justicia rosea Vahl, Enum. 1 : 165, 1804.

Dædalacanthus roseus T. Anders. in Journ. Linn. Soc. 9 : 487, 1867 ; Clarke, 419 ; Cooke, 363.

Eranthemum pulchellum Anders. var. *roseum* O. Kuntze, Rev. 489, 1891.

From my own experience both in the herbarium and in the field, this is the commonest species of *Eranthemum* in Bombay ; it is distinguished by its bracts that at times are fairly large and obovate and passing gradually from below upwards from acute, ovate to obtuse and obvate and mucronate. Both in the field and in the herbarium I have noticed a very great variation in the pubescence of the bracts, some being almost glabrous, others densely pubescent with ciliate margins ; the structure of the bracts and of the spike, however, varies but little. Generally it is a herb about 50 cms. high, but not seldom I have seen specimens in Khandala about 2 m. high and extensively branched.

To the specimens mentioned by Cooke and in addition to those of Khandala, which are being listed elsewhere, the following must be added from Blatter Herbarium: *Sedgwick*, Dharwar, Oct. 1916, 1844 ! Hulkop, Dec. 1917, 3172! Karwar, Dec. 1918, 5059! *Nana*, Bandra

Jan 1920, 7398 ! *Vakil,* Bandra, Febr. 1919, 31255 ! *Ezekiel,* Revdanda, Febr. 1917, 22878 ! *Acland,* Dapoli, Dec. 1921, 890 ! *Blatt. Herb.* Junagadh, Dec. 1907, 22905 ! Sion, 1916, 14855 ! Uran, Jan. 1917, 14830 ! Purandhar, Dec. 1917, 23169 ! 23175 ! Igatpuri, Jan. 1917, 23283 ! Ghatkopar, Nov. 1918, 28756 ! Matheran, March 1918, 23056 ! 23078 ! Kaneri Caves, Nov. 1918, 29005 ! Chanseli, Khandesh, Dec. 1918, 27390 ! Turanmal, Khandesh, Dec. 1918, 27160 ! Parsik Hill, Thana Dt., Dec. 1918, 28912 ! Ghodbunder, Nov. 1924, without number! *Santapau,* Jogeshwari, Oct. 1941, 152/29! Purandhar, Dec, 1944, 5673! Barda Hills, Kathiawar, Oct. 1945, 7852! *Kulp,* Purandhar, Oct. 1945, 8422 !

3. **Eranthemum purpurascens** Nees in Wall., Pl. As. Rar. 3 : 106, 1832 ; Gamble, 1025.
Dædalacanthus purpurascens T. Anders. in Journ. Linn. Soc. 9 : 488, 1867 ; Clarke, 420 ; Cooke, 364.
Justicia pulchella Roxb., Pl. Corom. 2 : t.177, 1798.
Eranthemum pulchellum Roxb., Fl. Ind. 1 : 111, 1832 ; Graham, 163 (non Andr.)
E. nervosum Dalz. & Gibs., Bomb. Fl. 195, 1861 (non T. Anders.).

Not quite as common as the preceding species. The distinguishing feature of the present species are the bracts, which are up to 25 mm. long, ovate below, tapering into a long acumination. The colour of the bracts is often the same as in *E. roseum,* i.e. very pale green or even white with darker green veins ; young bracts, however, are generally more or less uniformly green.

T. R. D. Bell, Sulgeri, N. Kanara, May 1919, 5958!

4. **Eranthemum nervosum** (Vahl) R.Br., Prodr. 1 : 477, 1810 ; Gamble, 1024 ; Bremek. in Rec. Trav. Bot. Neerl. 35 : 136, t.14E 1938.
Justicia nervosa Vahl, Enum. 1 : 164, 1805 ; Bot. Mag. t. 1358, 1811.
Dædalacanthus nervosus T. Anders. in Journ. Linn. Soc. 9 : 487, 1867 ; Clarke, 418 ; Cooke, 365.
Eranthemum pulchellum Andr., Bot. Repos. t. 88, 1800 (non Roxb.).

This is quite a distinct species ; bracts almost as broad below as those of *E. roseum,* but glabrous or nearly so, with a fairly long acuminate or cuspidate apex. The only specimens I have seen seem to come from cultivation: *Blatt. Herb.,* Victoria Gardens Jan. 1917, 16964! 16966! Bombay, March 1908, 14897! Bandra, Febr. 1910, 23875!

STROBILANTHES auct. (non Blume, emend. Brem.)

Most of the materials in the following sections have been taken from the recent book of Bremekamp, Materials for a Monograph of the Strobilanthinæ, in Verh. Ned. Akad. Wet. (II) 41(1) : 1—306, 1944.

That the very large number of plants combined under the name of *Strobilanthes* in Fl. Brit. Ind. is a very incongruous group is clear from the various attempts that have been made in the past to split the genus into manageable proportions. Recently at Kew, while discussing this point with Mr. I. H. Burkill, who knew Clarke well and on various occasions collaborated with him, I was informed that C. B. Clarke found the group *Strobilanthes* so difficult, when writing up his Acanthaceæ for the Fl. Brit. Ind. that in the end he gave up the idea of making any key for the genus and merely listed the 150 odd species one after the other under a very broad grouping.

T. Anderson seems to have realised the importance of the pollen structure for the study and proper separation of this group, but it was mainly Radlkofer (in Sitzung. Kon. Bay. Akad. 13 : 256, 1883) who initiated such a study. The results of careful investigation into the pollen structure of these plants have been so encouraging, that Bremekamp first in his Notes on the Acanthaceæ of Surinam (Rec. Trav. Bot. Neerl. 35 : 130-174, 1938) and more recently in the Mat. Mon. Strob. has not only made use of the pollen structure in general, but has practically based his classification on such a character. Gamble on the other hand remarks : "This large and very interesting genus (*i.e. Strobilanthes*) was subdivided by C. B. Clarke in the 'Malay Materials' and elsewhere into several genera characterised chiefly by the pollen grains. As an old Indian field worker I felt that the use of these characteristics would be most difficult for botanical investigators who can only very rarely have with them the necessary appliances for this study." (Kew Bull. 1924 : 238). This is a very fair remark, and for the same reason many botanists will be found to be rather slow in giving up the old-fashioned grouping in favour of a classification based on grounds that to many of them may appear rather feeble.

This reluctance on their part may be enhanced when they read the following remarks of Bremekamp, *op. cit.* p. 9 : "In view of the remarkable diversity in pollen structure displayed in this group it is noteworthy that different genera may nevertheless be provided with the same kind of pollen, be it echinulate or non-echinulate. Echinulate pollen of the same type is found *e.g.* in the genera *Pseudostenosiphonium, Lamiacanthus* and *Gutzlaffia,* which otherwise have very little in common, and ellipsoidal grains decorated with septate bands occur as

well in the Indian genus *Carvia* Brem...as in *Adenacanthus* Nees, *Goldfussia* Nees and several others. Ellipsoidal grains with smooth or punctate bands are typical for the genera *Hemigraphis* Nees, *Aechmanthera* Nees and *Stenosiphonium* Nees, but they are found also in a large number of species which were formerly included in *Strobilanthes*." For this very reason Bremekamp warns the reader that in such a study it is always dangerous to rely too much on one character to the exclusion of every other feature of the plants in question. "In my delimitation of the genera the structure of the pollen plays an important, but by no means exclusive part. A large number of other characters have been taken into consideration. They include : growth from ; equality or inequality of the leaves inserted on the same node ; structure of the inflorescence, especially size, shape and nervature of the bracts and bracteoles, and their early fall or persistence ; equality or inequality of the calyx segments, and length and shape of their free parts ; normal or resupinate position of the corolla, and the presence or absence of a bend between its tube and throat, further its colour, the arrangement of the hairs by which the style is retained against the upper lip, and the shape of the lobes ; the protrusion or inclusion of the stamens, and the difference in length between the outer and the inner ones, further the fertility, sterility or total suppression of the inner ones, and the shape of their filaments, whether straight or incurved, the erect or horizontal position and the shape of the anthers, and the presence or absence of a mucro or awn at their tips ; the number of ovules in each of the ovary cells and the presence or absence of subulate or capitate hairs on the top of the ovary and on the style ; and finally the very important structural pecularities of the seedcoat."

In the following pages I have followed Bremekamp's division of the old group *Strobilanthes* into several much smaller genera ; such a division seems to me to be the only logical one produced up to date.

The following key to the Bombay genera taken out of *Strobilanthes* Clarke et al. auct. is based on the pollen structure of the plants as the main feature, and has been adapted from Bremekamp, *op. cit.*, Conspectus Generum pp. 55 & seq.:

Pollen grain globose, echinulate, the spinules thickened at the base ... ... *Thelepæpale.*

Pollen grain ellipsoid:

Bands on the grains punctate ... ... *Nilgirianthus.*
Bands on the grain punctate, often wavy ... ... *Mackenziea*
Bands septate:

Flowers bracteolate ... ... *Pleocaulus.*
Flowers ebracteolate ... ... *Carvia.*

The following list gives the old established species of *Strobilanthes* as found in Cooke's Flora, and the new combinations made by Bremekamp with the various genera into which Cooke's *Strobilanthes* of Bombay State have been shifted in the new arrangement:

Cooke	*Bremekamp*
S. reticulatus Stapf	Nilgirianthus reticulatus
S. sessilis v. Ritchiei Clarke	Pleocaulus Ritchiei
S. lupulinus Nees	Nilgirianthus lupulinus
S. Heyneanus Nees	Nilgirianthus Heyneanus
S. callosus Nees	Carvia callosa
S. barbatus Nees	Nilgirianthus lupulinus
S. ciliatus Nees	Nilgirianthus ciliatus
S. scrobiculatus Dalz.	Uncertain.
S. warreensis Dalz.	Nilgirianthus warreensis
S. asper Wight	Nilgirianthus asper Santapau.
S. perfoliatus T. Anders	Mackenziea integrifolia
S. ixiocephalus Benth.	Thelepæpale ixiocephala
(S. Hallbergii Blatter	Uncertain).

19. NILGIRIANTHUS Bremek.

The following is the translation of the generic characters as given by Bremekamp, *op. cit.* 171: "Plietesial plants[1]), said to be gregarious and to flower all at once after an interval of several years, isophyllous. Leaves somewhat long petiolate. Inflorescence spicate, abbreviated, terminal and axillary, at times drooping. Bracts linear-oblong, oblong, ovate or obovate, imbricate, at times penninerved, at other times 3-many-nerved from the base, longer than the calyx, persistent. Flowers solitary in the axils of bracts, generally bracteolate. Bracteoles narrowly linear, 1- or occasionally indistinctly 3-nerved, shorter than the calyx, persistent, rarely absent. Calyx 5-partite or 5-fid; lobes triangular, acute or obtuse, 3-nerved, occasionally a little unequal, in which case the middle lobe is longer than the lateral ones. Corolla blue, rarely white, not resupinate, tube terete widening into a throat which is campanulate and shorter or longer than the tube; hairs arranged in two rows hold the style; lobes ovate, subacute, rounded or emarginate. Stamens

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(1) "As the term 'perennial' is usually reserved for polycarpic plants whose aerial parts regularly die down, and as there exist apparently no name for monocarpic plants of the kind most often met with in the *Strobilanthinæ*, I have introduced for them in my Latin descriptions the term "plantae plietesiae," *i.e.* plants living several years. As it seems desirable to have also a common name for plants showing this growth form, which in tropical and subtropical regions are by no means rare, I propose to call them in future 'plietesials'." (Bremekamp, *op. cit.* 20, in footnote).

mostly 4, didynamous or subsequal, all or the longer pair exserted, or all included, rarely the interior stamens reduced to staminodes ; filaments filiform, somewhat hairy in their whole length or only at the base, at times glabrous ; anthers erect, occasionally subacute, laterally complanate. Staminodes alternating with stamens, small or O. Pollen grains shortly ellipsoid, lined, the lines punctate. Ovary hairy with either capitate or ecapitate hairs, rarely glabrous ; ovules 2 in each loculus. Style glabrous or somewhat pubescent. Capsule fusiform generally 4-seeded. Seeds whitish, glabrous and shining, at times with mucilaginous hairs at the edge, areoles extended to the margin."

Key to the Bombay species of Nilgirianthus (adapted from Cooke)

Stamens 2 ... ... *reticulatus.*
Stamens 4:
  Flowers ebracteolate:
    Bracts glabrous or nearly so ... ... *heyneanus.*
    Bracts hairy ... ... *lupulinus.*
  Flowers bracteolate:
    Stems usually winged ; bracteoles longer than the calyx ... ... *barbatus.*
    Stems not winged ; bracteoles shorter than the calyx:
      Bracts glabrous ; peduncles long and slender ... ... *ciliatus.*
      Bracts glandular-hairy:
        Seeds glabrous ... ... *warreensis.*
        Seeds hairy ... ... *asper.*

1. **Nilgirianthus barbatus** (Nees) Bremek., *op. cit.*, 172, 1944.
Strobilanthes barbatus Nees in Wall., Pl. As. Rar. 3 : 85, 1832 ; Clarke, 437 ; Cooke, 368 ; Gamble, 1037.
Str. tetrapterus Dalz. in Kew Journ. Bot. 2 : 342, 1850 ; Dalz. & Gibs., 187.

Cooke on the authority of Beddome and Talbot, states that this plant flowers every seven years ; the following is the list of the flowering dates which I have been able to gather from Kew Herb. specimens: 1798, Rottler ; 1849, Dalzell ; 1851, Wight ; 1853, Ritchie ; 1885, Lawson ; 1889, Talbot ; 1890, Talbot ; 1894, Bourdillon ; 1913, Bourne ; 1935, Travancore (no name of collector on sheet).

The inflorescence of this plant is typical, with small spikes and bracts ending in a long, filiform appendage. The specimens named

S. tetrapterus Dalz. have their stems and branches broadly winged ; in my opinion such specimens deserve at least varietal rank, but require further study, especially as there seems to be a gradual transition from the merely angular to the broadly winged types.

In Kew Herb. I have examined the following specimens from Bombay : *Dalzell,* Wari country, Jan. 3, 1849 ! *Ritchie,* Febr. 1853, 1938! *Talbot,* Supa 1889, 1849! In Blatt. Herb. there is but one specimen from Bombay: *Sedgwick,* Yellapur April 1919, 5856!

2. **Nilgirianthus ciliatus** (Nees) Bremek., *op. cit.* 172, 1944.
Strobilanthes ciliatus Nees in Wall., Pl. As. Rar. 3 : 85, 1832 ; Clarke, 439 ; Beddome, Icon. Pl. Ind. Or. 49, t. 211 ; Cooke, 369 ; Gamble, 1039.

The most typical part of this species, at least as far as I have been able to trace from the sheets in Kew Herb., are the relatively small spikes ; the type sheet, Wallich 2415, has spikes but 6 mm. in diam. and 12-16 mm. long ; other sheets show spikes up to 20 mm. long. There are only two dated sheets in Kew Herb.: 1884, Lawson, and 1900, Bourne, both from Madras. Beddome, however, states that the plant flowers probably annually.

There are no sheets of this plant in Blatt. Herb. from Bombay.

3. **Nilgirianthus heyneanus** var. **Neesii** Bremek., *op. cit.* 173, 1944.
Strobilanthes heyneanus Nees in Wall., Pl. As. Rar. 3 : 85, 1932 ; Clarke, 443 ; Dalz. & Gibs., 187 ; Cooke, 367 ; Gamble, 1041.
Str. rugosus Wight, Icon. t. 1619, 1850.

Typical features of this plant are the absence of bracteoles, the glabrous bracts and the stiff, bulbous-based hairs on the upper surfacc of the leaves. Talbot, acc. to Cooke, suspects that the plant flowers annually. The following are the flowering dates taken from some of the sheets in Kew Herb. and Blatt. Herb.: 1806, Rottler ; 1850, Ritchie ; 1880, Beddome ; 1883, Talbot ; 1884, Gamble ; 1894, Talbot ; 1903, Bourne ; 1910, Haines ; 1917, Haines, Sedgwick ; 1918, Bell, Ahmed Khan ; 1919, Sedgwick and Bell, Nana.

The following is the list of the Bombay plants that I have examined: *Ritchie,* Ramghat, Nov. 588! *Talbot,* Nilkund, North Kanara, Dec. 1883, 791 ! *Sedgwick,* Anmod, N. Kanara, Dec. 1917, 3387! *Ahmad Khan,* Castle Rock, Aug. 1918, 4182! *Bell,* Sulgeri, N. Kanara, Aug. 1918, 4256! *Nana,* Castle Rock, March 1919, 5675! *Sedgwick* and *Bell,* Malemane Ghat, N. Kanara, Oct. 1919, 7223 !

4. **Nilgirianthus lupulinus** (Wall.) Bremek., *op. cit.* 173, 1944.
Ruellia lupulina Wall., Cat. 2355 a & c, 1830.
Strobilanthes lupulinus Nees in Wall.. Pl. As. Rar. 3 : 85, 1832 ; Clarke, 443 ; Cooke, 367 ; Gamble, 1041.
Str. Dalzellii T. Anders. MS in Kew Herb., ined.

The type sheet of *Strobilanthes Dalzellii* T. Anders. has been identified by Anderson himself ; but both Clarke and Gamble have corrected Anderson's identification to *Str. lupulinus* Nees ; this sheet, marked " Dalzell, Bombay " has a movable note attached with a pin, probably in the handwriting of Dalzell: " Strobilanthes with very glutinous bracts on the Ghauts covering much ground to the exclusion of everything else." The present species does have glandular-hairy bracts, but is far from being as common as Dalzell's note suggests ; on the other hand Dalzell's remarks apply fully to *Carvia callosa* Bremek. (*S. callosus* Nees) and in consequence I strongly suspect that there has been a translocation of Dalzell's note.

The only dated sheets in Kew Herb. are: 1850, Ritchie ; 1894, Talbot ; 1914, Rama Rao. There are no sheets from Bombay in Blatt. Herb.

5. **Nilgirianthus reticulatus** (Stapf) Bremek. *op. cit.* 173, 1944.
Strobilanthes reticulatus Stapf in Kew Bull. 1894 : 347 ; Cooke, 366.

" Flowers generally once in seven years. A remarkable formation covering large regular patches of open forest along the higher Konkan Ghauts." (Talbot, MS. in Kew Herb.) The only specimens in Kew Herb. from Bombay are: Cooke 1892! and Talbot 4151! collected in 1909 at Mahableshwar. I have examined the following specimens in Blatt. Herb.: Khandala, Oct. 1918, 28425 (without collector's name)! *Acland,* Mahableshwar, Oct. 1924, 887 & 888 ! *Sedgwick, ibid,* Nov. 1918, 4637! *Nana,* Mahaleshwar, Oct. 1920, 7621 ! According to Sedgwick there was a general flowering at Mahableshwar in 1918.

6. **Nilgirianthus warreensis** (Dalz.) Bremek., *op. cit.* 173, 1944.
Strobilanthes warreensis Dalz. in Kew Journ Bot. 2 : 341, 1850 ; Clarke, 429 ; Dalz. & Gibs., 187 ; Cooke, 370 ; Gamble, 1039.
Str. parviflorus Bedd., Icon. t. 197, 1874.

Dalzell's type sheet shows flowers in subinterrupted spikes, which are narrow and small ; the whole inflorescence is rather inconspicuous. As regards flowering and fruiting, the only sheets at Kew or Blatt. Herb. with exact dates on, are the following: 1853, Ritchie 1937 ! 1874, Beddome! 1885, Talbot, Agsoor, N. Kanara! 1889, Talbot, Nilkund, N. Kanara, 1859! Sedgwick & Bell, N. Kanara, 1919, 6874!

7. **Nilgirianthus asper** Santapau, nom. nov.
Strobilanthes asper Wight, Icon. t. 1518, 1850, nom. illeg. (non Decne, 1834).

A few words of explanation about the new name. The name *Strobilanthes asper* Wight is to be rejected as illegitimate, since acc. to the Rules it is a later homonym of *Strobilanthes asper* Decne. 1834, which was used for quite a different plant. I have named Wight's plant *Nilgirianthus asper* Santapau, nom. nov., which treated as a new name is perfectly legitimate since the specific epithet is not preoccupied for the genus *Nilgirianthus* and in consequence I am at liberty to select any such name for a plant ; moreover, there is no valid epithet for Wight's plant in the literature.

Bremekamp in Mat. Mon Strob. pp. 270 & 288 gives the identity of Wight's plant as still uncertain ; he suggests that it is possibly the same plant as *Nilgirianthus warreensis* Bremek. (*Strob. warreensis* Dalz.). I have examined the types of both species in Kew Herbarium and am quite satisfied that the plants are different ; for the sake of comparison I have drawn a table of the main features of both plants:

Nilg. warreensis	*Nilg. asper*
Coarsely hairy all over.	Thinly hairy or glabrous.
Leaves broadly lanceolate, acuminate at both ends, green on both sides, glabrous, up to 15×5 cm., entire to sharply serrate, strongly lineolate on both sides and with dense raphides clear to the naked eye on the upper side.	Leaves broadly ovate, green above, glaucous beneath, acuminate at apex, shortly tapering at base, fairly densely hairy especially on the nerves on both sides, up to 12×6.5 cm., crenate, not at all or only obscurely lineolate, raphides obscure.
Corolla 12 mm. long.	Corolla 18 mm. long.
Capsule 12 mm. long.	Capsule 8 mm. long.
Seeds 5 mm. long, elliptic, glabrous, areoles O.	Seeds 2 mm., orbicular, elastically hairy, areoles prominent, glabrous.

The main distinguishing features are the leaves, which are distinct even at first sight, and the differences are constant in all the sheets of these two plants in Kew Herbarium. The seeds are also quite distinctly different.

The specimens in Kew Herb. are mostly from South India and from Assam. In Blatt. Herb. there is one sheet, *Acland* 889! from Matheran, March 1925. The dates of flowering as gathered from the Kew sheets are these: 1844, Wight ; 1884, Gamble & Lawson ; 1893, Talbot ; 1908, Bourne ; 1929, Parry.

8 **Nilgirianthus membranaceus** (Talb.) Bremek., *op. cit.*, 280, 1944.
Strobilanthes membranaceus Talbot, Trees & Shrubs Bomb., ed. 2, 261, 1902 ; Cooke, 373 ; Talbot, For. Fl. 2 : 327, t.444.

For a full description and a good diagram of the plant see Talbot, *loc. ult. cit.*

The most typical part of the plant is the leaf and in the leaf the margin, with its closely arranged crenatures and rough general structure. In Blatt. Herb. I have seen three sheets: *Sedgwick*, Anmod, N. Kanara, Dec. 1917, 3206! *Nana*, March 1919, Castle Rock, 5608! 5645! I have not seen the plant in its wild state. Talbot, *loc. ult. cit.*, states that it is "gregarious in monsoon and rain-forest ; common in the jungles near Anmode, Supa taluka also near Yellapore. Flowers apparently after long intervals during the cold season in November. Fr. Jan.-Febr." (p. 328).

At first sight the plant may be taken for *Carvia callosa* Bremek., but *Carvia* is a much larger plant and flowers in the rains, whilst the present species flowers during the cold season.

20. MACKENZIEA Nees.

"Plietesial plants, gregarious, flowering together at one time after an interval of several years, isophyllous. Leaves petiolate or sessile. Inflorescence spicate, elongated, forming terminal panicles. Bracts decussate or subdecussate, generally each bract subtending a flower, penninerved, mostly persistent. Flowers solitary in the axils of bracts, bracteolate. Bracteoles about as long as the calyx or longer. Calyx 5-partite, lobes narrow, the middle lobe generally a little longer than the rest. Corolla white, blue or purple, not resupinate ; tube short, throat long campanulate, hairs holding the style arranged in two rows ; lobes obcordate. Stamens 4, included didynamous, all erect ; filaments of the longer stamens pubescent or somewhat hairy towards the base ; anthers erect, obtuse or mucronulate at the apex. Staminodes generally O. Pollen grains ellipsoid, lined or banded, the bands often with a wavy rib, seldom punctate. Ovary hairy with capitate hairs. Capsule obovoid or oblong, acute or mucronate, with 2-4 seeds from the base. Seeds exareolate, white-silky with rigid, acute hairs." (Translat. from Bremekamp, *op. cit.* 181-182).

Mackenziea integrifolia (Dalz.) Bremek., *op. cit.*, 182, 1944.
Endopogon integrifolius Dalz. in Kew Journ. Bot. 2 : 343, 1850 ; Dalz. & Gibs., 185.

Strobilanthes integrifolius O. Kuntze, Rev. 499, 1891 ; Gamble, 1043.
Leptacanthus alatus Wight, Icon. t. 1527, 1850.
Strobilanthes perfoliatus T. Anderson, in Journ. Linn. Soc. 9 : 471, 1867 ; Clarke, 458 ; Cooke, 371 ; Santapau in Journ. Bombay Nat. Hist. Soc. 44 : 605.

As for the flowering periods, Cooke mentions that according to Talbot it flowers every seven years, and according to Birdwood every three years. The sheets at Kew and in Blatt. Herb. show flowering to have taken place the following years : 1866 ; 1885, Talbot ; 1886, Bl. Herb ; 1889 Talbot ; 1918, Sedgwick ; 1919, Bell ; 1925, Acland ; 1943, 1944, 1945 Santapau, the last three years being from the same locality, where the plant is very abundant.

I have seen the following sheets from Bombay (not to mention a large number from Khandala of my own collection, which are being listed elsewhere) : *Talbot,* Gondhela, N. Kanara, March 1885 ! *Talbot,* N. Kanara, March 1889, 1808! *Blatt. Herb.* (without collector's name), Matheran, March 1886, 23829 ! *Sedgwick,* N. Kanara Dec. 1918, 5001 ! *Bell,* Gudehalli, N. Kanara, March 1919, 5757 ! *Acland,* Matheran March 1925, 923 !

21. PLEOCAULUS Bremek.

" Perennial herbs ; erect, simple shoots coming from a many-headed rhizome. Leaves sessile, ovate, cordate. Inflorescence spicate, squarrose, terminal and axillary. Bracts ovate, callous-denticulate and ciliate on the margins, with a midrib that broadens towards the base and is ciliate in two rows above, penninerved, longer than the calyx, imbricate, persistent. Flowers solitary in the axils of bracts, ebracteolate. Calyx subsequally 5-partite ; lobes lanceolate, mucronate at the apex, the middle one narrower. Corolla purplish, not resupinate, straight ; tube terete, shorter than the throat ; throat campanulate, the hairs holding the syle arranged in two rows ; lobes subequal, obcordate. Stamens 4, didynamous, all included or occasionally the longer pair exserted ; filaments of the longer stamens hairy in their whole length or only towards the base ; shorter filaments glabrous, all erect ; anthers erect, obtuse at the apex, laterally complanate. Staminode small. Pollen grains ellipsoid, banded with septate bands. Ovary shortly hairy with capitate hairs ; ovules 2 in each loculus. Style moderately hairy. Capsule fusiform, glabrous or hairy with capitate hairs, 4-seeded. Seeds brown, said to be exareolate, hygroscopically hairy all over." (Translat. of Bremekamp. *loc cit.* 185).

Bremekamp has included in this genus three species which in the literature are often considered but varieties of the same species: *Pleocaulus Ritchiei*, *P. Sessilis* and *P. Sessiloides*. These species or varieties differ from the rest of the *Strobilanthinæ* in that they have an underground many-headed rhizome, from which new ærial shoots are produced every year ; the name *Pleocaulus* refers to this particular habit.

Pleocaulus Ritchiei (Clarke) Bremek., *op. cit.*, 185, 1944.
Strobilanthes sessilis Nees var. *Ritchiei* Clarke in Fl.Brit.Ind. 4 : 452, 1884 ; Cooke, 366.
Str. sessiloides Dalz. & Gibs., Bomb. Fl. 187, 1861 (non Wight).

There are two dated sheets in Kew Herb. from Bombay; the type of Clarke's variety, the present plant, Ritchie, Oct. 1852 and a second sheet of Talbot, Nov. 1889 ; in Blatt. Herb. I have seen plants in flower of the years 1919 and 1922. Cooke, citing Talbot as his authority, states that the plant flowers once in seven years, although separate flowering clumps are to be found in September and October of the years other than those of the general flowering. Precise data from field botanists are required as to the habit and dates of flowering of this plant.

I have examined the following sheets of this species: *Ritchie* Parwar Ghat, Oct. 1852, 1207! *Talbot*, Ramghat, Belgaum Dt., Nov. 1889, 2119! *Hodgson*, Amboli Ghat, Belgaum Dt., 1919, 7576! and in Blatt. Herb. 32343! *Sedgwick*, Khandala, Nov. 1922, 7991 ! *Idem*, Sampkhand, N. Kanara, Oct. 1919, 6959 ! *Hallberg* and *McCann*, Sampkhand Oct. 1919, 34647!

22. CARVIA Bremek.

"Plietesial plants, gregarious, isophyllous or slightly anisophyllous. Leaves tapering into the petiole, scabrid above with bristles each of which is the centre of a cluster of cystoliths, densely ciliate on the margins. Inflorescence spicate, short and thick, terminating short axillary branches, which bear greatly reduced leaves. Bracts ovate-orbicular, concave, somewhat densely ciliolate on the margin, penninerved, persistent, longer than the calyx. Flowers solitary in the axils of bracts ; bracteoles O. Calyx evenly 5-partite, lobes linear, obtuse, imbricate. Corolla purple, not resupinate ; tube short, terete ; throat campanulate, longer than the tube, the hairs retaining the style arranged in two rows ; lobes orbicular, large, subequal.

Stamens 4, didynamous, included ; longer filaments hairy, shorter ones glabrous, all erect ; anthers erect, obtuse at the apex, laterally complanate. Staminodes small. Pollen grains ellipsoid, banded, the bands septate. Ovary subglabrous, ovules 2 in each loculus. Style hairy, the hairs inserted at the base, capitate. Capsule elliptic in outline, compressed, acute, glabrous, 2-seeded. Seeds whitish, much compressed, with a large areole, and hygroscopically annulate hairs round the areole." (Transl. from Bremek., *op. cit.*, 186).

A monotypic genus containing but one species *Carvia callosa* (Wall.) Bremek. The generic name has been based on the vernacular name *Karvi* by which the plant is known in Western India, where the species is endemic.

Carvia callosa (Wall.) Bremek., *op. cit.* 187, 1944.

Ruellia callosa Wall., Cat. 2359, 1830.

Strobilanthes callosus Nees in Wall., Pl. As. Rar. 3 : 85, 1832 & in DC., Prodr. 11 : 185, 1847 (pro max. parte) ; T. Anders. in Journ. Linn. Soc. 9 : 469 ; Clarke, 451 ; Dalz. & Gibs., 188 (excl. descr. semin.) ; Kirtikar in Journ. Bomb. Nat. Hist. Soc. 7 : 64, t.A. ; Constable in Kew Bull. 1896: 98 ; Bot. Mag. t.7538, 1897 ; Cooke, 368 ; Santapau in Journ. Bomb. Nat. Hist. Soc. 44 : 605, 1944.

Str. grahamianus Wight, Icon. t. 1520 ; Dalz. & Gibs., 188 ; T. Anders. *loc. cit.*

Str. ciliata ? Graham, Cat. 162, 1839.

Very common on the Western Ghats. "Flowers in October, of a bright blue ; in closely imbricated cone-like spikes, formed by the bracts...Grows in great abundance on the Ghauts, frequently covering acres of ground, to the exclusion of everything else besides...The natives have a tradition that it flowers only once in 10 years." (Graham, *loc. cit.*).

In Khandala and Purandhar it is one of the most abundant plants ; in 1943 and 1944 there was a general flowering extending from Mount Abu in Rajputana through Khandala and Purandhar to Castle Rock in N. Kanara, and possibly further south. Even plants but 15 cms. high produced a number of spikes and flowers. In large specimens, one often sees numerous spikes coming out not only from the axil of present leaves, but also from all along the stem at the nodes, that is to say, inflorescence is from the axils of leaves and from the old wood. The whole inflorescence is glabrous during the flowering season, and only begins to develop glandular hairs towards the middle of December, when most of the flowers have disappeared and fruits are developing. Dehiscence of the capsules takes place mainly at the beginning of the following monsoon, the seeds often germinating *in situ, i.e.* within the

capsule which is still on the dead parent plant, or being thrown explosively some distance away by the sudden fracture of the capsule.

Regarding the scent of the glands of this plant, Constable writes on Jan. 3, 1896 (Bot. Mag. sub. t. 7538, June 1987): "I was walking on a steep mountain side (in Khandala) through half a mile or more of these trees, close together, simply laden with buds (i.e. with the fruiting spikes, not flower buds). There was in the air a sweet resinous, pleasant odour from the buds. My hands were covered with what they exuded, and—this is the point—though I washed my hands three times, the pleasant scent remained."

During the general flowering of 1943 and 1944, I observed the following in Khandala. About the middle of the monsoon of 1942 there had appeared a few scattered plants in flower, the number of such plants in the whole district being only about 10 or 12 ; the following year, 1943, there was a general flowering on the higher hills like Bhoma, Echo Point, Behran's Plateau, and in scattered patches on the lower parts of Khandala ; after flowering the plants died, and large numbers of seedlings appeared after a few days of rain at the beginning of the next monsoon. In 1944 the general flowering spread to the rest of the district, *i.e.* to the lower parts of the hills and to some of the ravines. In 1945, there were to be found a number of scattered plants in flower, but such scattered flowering could in no way be called general ; finally during August 1946 in three days of intensive search I only did find one plant in flower. C. McCann, my constant companion for several years in my excursions through Khandala, informed me that our observations of 1942-1946 exactly coincided with his previous observations of 1928 in the same locality.

Normally this plant is about 2 m. high, with an erect, simple or sparingly branched stem. In sheltered situations, as on the slopes below Duke's Nose in Khandala, it reaches 4-5 m. in height, with a stem upto 15 cms. in diam. and with numerous branches on the upper part. Flowers on these large plants are mostly from the upper parts, but numerous spikes are to be seen coming out of the old wood almost down to the ground, and such spikes come out either singly or in very dense paniculate clumps. The bracts are either pale-green, or creamy white, or green to white on the side facing the ground and rosy pink in the rest of the spike ; when the spike is erect, it may be entirely pink. This pink colour is very conspicuous, as due to the abundance of spikes the whole mountain side may assume a reddish or pinkish hue, at least before the appearance of the flowers.

As to the flowering periods, no conclusion can be drawn from the scanty data collected up to date. The following dates have been gathered from some of the specimens in Kew Herb. and elsewhere:

1878, Mt. Abu, King ; 1881, Talbot ; 1885, Talbot ; 1887, Duthie ; Talbot ; 1891, Duthie ; 1895, Constable ; 1917, McCann ; 1918, Ahmad Khan, Bell, Sedgwick ; 1926 and 1927, Acland ; 1928, McCann ; 1942-1946, Santapau ; 1949, Santapau.

The following specimens of Bombay have been examined by me in Kew and other Herbaria (Khandala specimens being omitted from this list): *Talbot,* below Ghats, N. Kanara, Nov. 1881 ! Anmode, March 1889, 1616 ! *King,* Abu, Sept. 1878 ! *Talbot,* Ainshi Ghat, Oct. 1885, 1342! *Wight,* " Bombay, Graham "! *Duthie,* Abu, 1887, 6690! *Ahmad Khan,* Castle Rock, Aug. 1918, 4185 ! *Bell,* N. Kanara, Aug. 1918, 4276! *Sedgwick,* Mahableshwar, Nov. 1918, 4612 ! *Nana,* Castle Rock, March 1919, 5647! *Acland,* Panhala, Oct. 1927, 904 ! Kaneri Caves, Sept. 1926, 920! *Blatt. Herb.* (without collector's name) Purandhar, Jan. 1918, 23178! Dec. 1917, 23071! 23070! 23022! *Santapau,* Kaneri Caves, Aug. 1945, 7045! Purandhar, Dec. 1944, 5624! Ibid. Sept. 1945, 7233!

23. THELEPAEPALE Bremek.

" Plietesial plants, isophyllous or slightly anisophyllous. Inflorescence spicate, short, terminal and by the shortening of the branches becoming paniculate. Bracts ovate-lanceolate, penninerved, much longer than the calyx, persistent ; the lower ones always opposite, the rest at times alternating, arranged however in a four-sided spike. Flowers solitary in the axils of bracts, bracteolate. Bracteoles narrow, a little shorter than the calyx. Calyx more or less equally 5-fid ; lobes narrowly lanceolate, callous at the apex, æstivation reduplicate. Corolla white, not resupinate ; tube terete, about as long as the throat ; throat campanulate, the hairs retaining the style arranged in two rows ; lobes subequal, ovate, rather large. Stamens 4, didynamous, included ; filaments of the outer stamens more than twice as long as the those of the inner ones, slightly hairy at the base ; shorter filaments incurved ; anthers erect, oblong, retuse at the apex, the cells patent. Staminode O. Pollen grains globose, echinulate, the echinulate process mammiliform, large. Ovary very shortly hairy with capitate hairs ; ovules 2 in each loculus. Style faintly pubescent. Capsule ellipsoid, generally 2-seeded. Seeds whitish with a large areole, hygroscopically hairy around the areole. (Transl., from Bremekamp, *op. cit.* 187—188).

Thelepæpale ixiocephala (Benth.) Bremek., *op. cit.* 188, 1944.
Strobilanthes ixiocephalus Benth. in Flora 32 : 557, 1849 ; Clarke, 444 ; Beddome, Icon. 47, t. 203, 1874 ; Cooke, 372 ; Talbot, For.

Fl. 2 : 329 ; Santapau in Journ. Bomb. Nat. Hist. Soc. 44 : 605.
Str. eriocephalus Benth., sphalm. apud T. Anders. in Journ. Linn. Soc. 9 : 466, 1867.
Str. Neesiana Wight, Icon. t. 1523, 1849 ; Dalz. & Gibs., 188.
Str. glutinosa Graham, Cat. 162, 1839 (non Nees).
Ruellia imbricata Graham, Cat. 162, 1839 (non Roxb.)

" Generally found in thick jungle below the shade...grows in great abundance in the ravines at Kandalla, and about Parr ;—flowers in the cold season." (Graham, *loc. cit.*)

In Khandala it is a very common plant, and during the years 1943 to 1945 I had plenty of occasions of observing it in detail in flower and fruit. It is gregarious, but not so abundant as *Carvia callosa ;* moreover, it is practically absent from the higher parts of the district. On the other hand it is very abundant in the ravine below St. Xavier's Villa *i.e.* between St. Xavier's Villa-Convalescent Home and the old Reversing Station ; it seems to prefer the shade of trees to an open situation. The whole inflorescence is viscous-hairy, and highly scented, the scent being rather pleasant and very persistent.

Flowering periods: " Nov.-Jan., septennially (H. M. Birdwood) or annually (Talbot)" (Cooke, *loc. cit.*) The following are the flowering dates which I have been able to ascertain from specimens at Kew and elsewhere : 1849, Dalzell ; 1852, Ritchie ; 1884, Talbot ; 1889, Talbot ; 1918, Bell, Sedgwick ; 1919, Bell, Nana ; 1920, Nana ; 1928, Acland ; 1942-1946, in Khandala, Santapau.

Specimens examined: *Dalzell,* Wari country, Jan. 1849! *Ritchie,* Kala Nadi, Dec. 1852, 1216! *Talbot*, Woodderookli (?), Febr. 1884! Coomberwala, N. Kanara, Febr. 1889, 1829! Ainshi Ghat, Febr. 1889, 1854! *Blatt. Herb.,* Purandhar, Jan. 1918, 23096! *Sedgwick,* Arbail Ghat, N. Kanara, Dec. 1918, 5031 ! Karwar, Dec. 1918, 5122 ! *Bell,* Ainshi Ghat, Apr. 1918, 3935! Idem, Gudehalli, N. Kanara, March 1919, 5740! 5756! *Nana,* Castle Rock, March 1919, 5604! Mahableshwar, Oct. 1920, 7629! *Acland,* Castle Rock, April 1928, 924! The list of Khandala specimens in Blatt. Herb. is given in my Flora of Khandala.

Uncertain Genus.

Strobilanthes scrobiculatus Dalz. ex Clarke, in Hook.f., Fl.Brit.Ind. 4 : 445, 1884 ; Cooke, 369.

Bremekamp gives this plant as uncertain, *i.e.* he finds it impossible to determine the genus under which it should be placed. I have

examined a number of specimens in Kew Herb. and in Sedgwick collections in Blatt. Herb., but can find no data as regards the type of pollen ; in the literature no mention is made of the pollen structure.

I have examined the following specimens: *Dalzell*, 5/74! *Talbot*, Amod, March 1889, 1812! *Cooke*, Nov. 1888, Mahableshwar! *Acland*, Mahableshwar, Oct. 1924, 886!

24. CALACANTHUS T. Anders.

Calacanthus grandiflorus (Dalz.) Radlk. in Stizung. Math.-Phys. Acad. Muench. 13 : 279, 1883 ; O. Kuntze, Rev. 483 ; Lindau in Pfam. 4(3B): 305.

Lepidagathis grandiflora Dalz. in Kew Journ. Bot. 2 : 138, 1850 ; Dalz. & Gibs., 190 ; Beddome, Icon. 54, t. 226, 1874.

Calacanthus Dalzelliana T. Anders. ex Benth. & Hook., Gen. Pl. 2 : 1088, 1876 ; Clarke, 478 ; Cooke, 373 ; Gamble, 1044.

This is a monotypic genus endemic in Western India. As regards the name, Lindau, *loc. cit.*, writes: "C. grandiflorus (Dalz.) T. Anders."; I have been unable to trace Anderson's reference, and for this reason attribute the combination to Radlkofer, the earliest one which I have found.

To the localities mentioned by Cooke must be added Khandala ; in Blatt. Herb. there are several sheets collected in Oct. 1918 (28354! 28038 ! etc.) and a few sheets of my own collection. It is not a common plant, but when found, it occurs in fairly large clumps, with very typical leaves and flowers.

25. ANDROGRAPHIS Wall.

For a key to the Bombay species, see Cooke, p. 374.

1. **Andrographis paniculata** (Burm.) Wall. ex Nees in Wall., Pl. As. Rar. 3 : 116, 1832 ; Clarke, 501 ; Wight, Icon., t. 518 ; Dalz. & Gibs., 198 ; Lindau, 323, f.111 E—J ; Cooke, 374 ; Gamble, 1048.
   Justicia paniculata Burm., Fl. Ind. 9, 1768 ; Graham, 164.

In the literature generally the specific name is attributed to Nees ; this is not correct, as Nees himself, *loc. cit.*, attributes it to Wallich.

To the specimens mentioned by Cooke, the following should be added: *Sedgwick,* Hubli, March 1917, 2347! Aug. 1918, 4199! Dharwar Dt., Jan. 1919, 5216 ! Karwar Dt., Oct. 1919, 6728 ! *Acland* Bombay, Dec. 1931, 953—956! *Santapau,* Barda Hills, Oct. 1949, 10360 ! *Blatt. Herb.,* Bombay, Nov. 1917, 14780 !

2. **Andrographis echioides** (Linn.) Nees in Wall., Pl. As. Rar. 3 : 117. 1832 ; Clarke, 505 ; Dalz. & Gibs., 198 ; Cooke, 374 ; Gamble, 1051.
Justicia echioides Linn., Sp. Pl. 16, 1753 ; Roxb., Fl. Ind. 1 : 118, 1832 ; Graham, 164.

A very typical plant, mainly on account of the erect, candelabrum-like arrangement of the flowers, which are generally placed on the upper side of a horizontally spreading rachis in axillary racemes. The plant is fairly common in the drier parts of Bombay.

Sedgwick, Yelvigi, Febr. 1918, 3702! *Bell,* Poona, June 1919, 6167! *Acland,* Khorda, Ahmednagar, Jan. 1920, 925 ! *Blatt. Herb.* Jan. 1916, Bhusaval, Khandesh, 26666! 23131! Diva Ghat, Poona, Dec. 1917, 23084 ! *Santapau,* Jamnagar, Oct. 1945, 7657 ! 7658 ! 9757 ! *Dhruna,* Dwarka, 2!

26. HAPLANTHUS Nees.

Key to the Haplanthus of Bombay :

Cladodes stout, quadrangular, 20 mm. long or more ; capsules glabrous, shining, 10 mm. long	*verticillatus.*
Cladodes slender, subquadrangular, up to 18 mm. long ; capsules pubescent, dull, up to 8 mm. long:	
Inflorescence in whorls mostly collected in terminal spikes	*neilgherryensis*
Inflorescence whorls scattered along the stem and branches, not collected in terminal spikes:	
Calyx densely hispid-hairy, subplumose	*tentaculatus* var. *plumosa.*
Calyx hairy, but not densely hispid-hairy, nor subplumose	*tentaculatus* var. *Neesiana.*

1. **Haplanthus verticillatus** (Roxb.) Nees in DC., Prodr, 11 : 513, 1847 ; Clarke, 506 ; Dalz. & Gibs., 197 ; Cooke, 375 ; Gamble, 1052. (" *Verticillaris* ").

Justicia verticillata Roxb., Fl. Ind. 1 : 135, 1832 ; Graham, 165.
Eranthemum verticillatum Dalz., MS. ined., in Kew Herb.

A very common plant on the Ghats, noticeably so in Khandala throughout the hot season ; after the leaf fall, early in winter, this plant has a "formidable look." When the fresh leaves and flowers are on, it is an attractive plant. It is common by the sides of paths or in clearings, occasionally in the undergrowth, in the forest.

"On the hilly country called Purimdar (Purandhar), near Sasroor (Saswad) in the Deccan, from September to November (Perrotet! in h. D.C.....)" Nees, *loc. cit. Acland,* Dapoli, Dec. 1921, 922 ! *McCann,* Purandhar, Dec. 1917, 23088 ! Blatt. Herb. 23905 ! Pen, Febr. 1917 ! Chanseli, Khandesh, Dec. 1918, 27388 ! Turanmal, Khandesh, Dec. 1918, 27395 ! Kaneri Caves, Nov. 1918, 28939 ! *Ferreira,* Matheran, March 1918, 23196! *Santapau,* Purandhar, Dec. 1944, 5631! Barda Hills, Oct. 1945, 7821! In addition to these specimens I have seen numerous ones from Khandala, where the plant is very common, and Mt. Abu in Rajputana ; the plant seems rather rare in Madras, to judge from the collections in Kew Herbarium.

2. **Haplanthus neilgherryensis** Wight, Icon. t. 1556, 1850 ; Gamble, 1052.
H. tentaculatus var. *neilgherryensis* Clarke in Fl. Brit. Ind. 4 : 507, 1884 ;
H. tentaculatus Nees in DC. Prodr. 11 : 513, 1847 & Cooke, 376 ambo pro parte tantum.

This is quite a distinct plant, and I fully agree with Gamble in restoring it to specific rank. The stem and branches are generally bare of whorls, which are mostly gathered at the end of the branches in fairly dense spikes 1.5—3 cms. long. The capsules are about the smallest among the *Haplanthus* of Bombay, generally being only about 5 mm. long.

In addition to numerous specimens from Khandala, I have examined the following: *Sedgwick,* Castle Rock, Dec. 1917, 3423! *Bell,* Thana forests, Febr. 1918, 3632! 3762! *Nana,* Bandra, Bombay Jan. 1920, 7396!

3. **Haplanthus tentaculatus** (Linn.) Nees, var. **Neesiana** Santapau, nom. nov.
Ruellia tentaculata Linn., Cent. Pl. 2 in Amoen. Acad. 4 : 320, 1759 ; Willd., Sp. Pl. 3(1) : 368, 1801.
H. tentaculatus Nees in DC. Prodr. 11 : 513, 1847 & Cooke, 376 pro parte.

Varietas haec est varietas typica speciei *H. tentaculati* Nees ; accedit ad *H. neilgherryensem,* sed differt eo quod verticilli sunt plus minusve distributi per omnes fere nodos plantæ ; accedit etiam ad varietatem *plumosam,* sed differt eo quod verticilli sunt pubescentes vel pilosi, non vero plumosi.

This is the typical variety of *H. tentaculatus,* clearly differing from *H. neilgherryensis* in having the whorls distributed practically through the whole plant, and not gathered at the ends of the branches ; it is more nearly allied to the var. *plumosa,* but differs in having the whorls more or less hairy, but not densely plumose as in the latter variety.

Fairly common on the Ghats especially during the rains and the first part of winter. It is found along the paths or in clearings in fairly dense forest or occasionally in open country ; it is not so common as *H. verticillatus.*

Common in Khandala ; in addition I have seen the following specimens : *Blatt. Herb.:* Condita, Dec. 1916, 23107! Matunga, Dec. 1916, 14900! Uran, Jan. 1917, 14831! 14838! Bandra, Jan. 1920, 1588! *Ezekiel,* Mahalaxmi, 27 June 1917! *Santapau,* Uran, March 1941, 152/2! Kaneri Caves, Jan. 1942, 152/62! Bassein Fort, Febr. 1949, 9895!

4. **Haplanthus tentaculatus** Nees, var. **plumosa** (T. Anders.) **C. B.** Clarke, in Fl.Brit.Ind. 4 : 507, 1884.
   H. plumosa T. Anders., in Journ. Linn. Soc. 9 : 504, 1867.
   H. tentaculatus Cooke, in Fl. Pres. Bombay 2 : 376, 1904, pro parte.

The calyx of this variety is " densely hairy, subplumose," the hairs being whitish or pale-grey ; the differences between this plant and the typical variety are clear at first sight: in this plant there is a dense mass of whitish hairs covering the inflorescence, except the upper part of the corolla limb. This variety seems to be more common during the drier parts of the year from December onwards.

Common in Khandala. In Blatt. Herb. there are the following specimens from Matheran: 23081, 23082 & 23084, collected during March 1918.

27. GYMNOSTACHYUM Nees.

O. Kuntze (Rev. Gen. Pl. p. 483, 1891) rejected the generic name *Gymnostachyum* and held that the only correct one was *Cryptophragmium.* As both names were published on the same date by Nees, there

can be no question of priority as understood by the International Rules of Bot. Nomencl. R. Brown in 1810 used the named *Gymnostachys* for a different plant, and O. Kuntze contends that *Gymnostachys* is but a variant for *Gymnostachyum* or *vice versa*, and that in consequence *Gymnostachyum* is a later homonym and must be rejected. In my opinion, however, these two are different names which in accordance with the second half of Art. 70 and Note 4 of the Rules " must be treated as distinct, even though differing by one letter only ": the present case of *Gymnostachys* and *Gymnostachyum* appears to be the same as that of *Desmostachys* and *Desmostachya*, which are accepted as two different names by the Rules (p. 23, line 10, edit. 1935; p. 27, line 16, edit. Brittonia 1947). In view, moreover, of the fact that *Gymnostachyum* has been accepted as the correct name by most authors of Indian Floras, I judge it best not to make unnecessary changes for another name, whose priority on the other hand is far from being satisfactorily proved by Kuntze's arguments.

Key to the species from Bombay

Corolla, small, up to 18mm. long; anthers puberulous *canescens.*
Corolla 25 mm. or more long; anthers glabrous:
Flowers in axillary racemes or panicles, capsule glabrous ... ... *latifolium.*
Flowers in terminal spikes or racemes; capsule ... glandular hairy ... ... *glabrum.*

1. **Gymnostachyum latifolium** (Dalz.) T. Anders. in Journ. Linn. Soc. 9 : 505, 1867; Clarke, 509; Beddome, Icon. 61, t. 253; Cooke 376; Gamble, 1053.
Cryptophragmium latifolium Dalz. in Kew Journ. Bot. 2: 137, 1850; Dalz. & Gibs., 185; Kuntze, Rev. 483.
Phlogacanthus latifolius Wight, Icon. t. 1537, 1850.

Judging from the specimens in Kew Herb., this plant is endemic in the Southern districts of Bombay and in Madras State. The flowers seem to be yellow. In addition to Dalzell's type sheet in Kew Herb., I have seen these specimens from Bombay: *Sedgwick*, Castle Rock, Aug. 1917, 2771 ! Anmode, N. Kanara, Dec. 1917, 3284 ! *Nana*, Castle Rock, March 1919, 5583 ! *Bell*, Sulgeri, N. Kanara, Aug. 1918, 4280 ! N. Kanara, May 1919, 5962 ! Ainshi, N. Kanara, Oct. 1920, 152/13 & 14 ! *Blatt. Herb.*, Castle Rock, Dec. 1890, 23858 !

2. **Gymnostachyum glabrum** (Dalz.) T. Anders. in Journ. Linn. Soc. 9 : 506, 1867; Clarke, 509; Beddome, Icon. 61, t. 251; Cooke, 377.

Cryptophragmium glabrum Dalz. in Kew Journ. Bot. 2 : 338, 1850 ; Dalz. & Gibs., 185 ; Kuntze, *loc. cit.* ; Lindau, 324.

Comparison between the type sheets from Dalz. Herb. and the type of var. *denticulata* Clarke shows that Cooke is justified in refusing to accept the variety as different from the typical plant ; the denticulations of the leaves are but a very inconstant character. This plant is endemic in Bombay. The corollas are white.

I have examined these sheets from Bombay: *Dalzell* "The Ghauts, 4000 ft. above the sea—flr. in January 1848"! *Hooker,* 1848, Concan, Bombay ! *Law* "Mahableshwar Hills"! *Dalzell,* "foot of the Ghauts. Fl. in February"! Talbot, March 2, 1889, Nilkund, N. Kanara! *Talbot,* Nilkund, Dec. 1883, 785! *Ritchie,* Ramghat, Febr. 1853, 1211! Kala Naddi, Dec. 1852, 1211! *Blatt. Herb.,* Castle Rock, Dec. 1890, 23858! Ibid. Jan. 1891, 23863!

3. **Gymnostachyum canescens** (Nees) T. Anderson, in Journ. Linn. Soc. 9 : 505, 1867 ; Clarke, 509.
Cryptophragmium canescens Nees in Wall., Pl. As. Rar. 3 : 100, 1832 & in DC., Prodr. 11 : 95, 1847 ; Wight, Icon. t. 1495.

Not included in Cooke's Flora. Clarke, *loc. cit.,* gives the locality as "W. Deccan Peninsula, from Bombay to Courtallum, Wight..." In Kew Herb. there is a sheet labelled "Bombay," but the name of the collector is not mentioned.

28. CROSSANDRA Salisb.

Crossandra infundibuliformis (Linn.) Nees in Wall., Pl. As. Rar. 3 : 98, 1832 & in DC., Prodr. 11 : 280, 1847 ; Lindau, 319, f.126 J-T.
Justicia infundibuliformis Linn., Sp. Pl. 21, 1753.
Ruellia infundibuliformis Andr., Bot. Rep. t. 542, 1808 ; Graham, 161.
Crossandra undulæfolia Salisb., Parad. Lond. t. 12, 1805 ; Clarke, 492 ; Cooke, 378 ; Gamble, 1055.
Cr. axillaris Nees, *loc. cit.* ; Wight, Icon. t.460 ; Dalz. & Gibs., 193.
Cr. coccinea Dalz. & Gibs., Bomb. Fl., Suppl. 71, 1861.

Commonly cultivated, rarely wild. Corolla orange-yellow, split down the back and forming a 5-lobed lip ; lobes distinctly unequal,

the middle one the largest. Anthers hairy with a longitudinal row of hairs, one-celled. Seeds typical, covered with appressed, fringed scales.

In Kew Herb. I have examined the specimens mentioned by Cooke for Bombay ; in Blatt. Herb. there is but one sheet collected in Victoria Gardens, Bombay, Febr. 1917, 16980 !

29. BARLERIA Linn.

In the following pages I have left out *B. acanthoides* Vahl and *B. Hochstetteri,* Nees, as neither species seems to be found in the present Bombay State. I have included *B. longiflora* Linn. f. and *B. Gibsonioides* Blatt. and one new species of my own, *B. prattensis ;* at the same time I have tried to clear up the confusion between *B. montana* and *B. Gibsoni* and have shown that the former species must be excluded from Bombay Flora.

Key to the species of Barleria (adapted from Cooke)

Spinous plants:

Capsule 2-seeded ; outer sepals spine-tipped ; leaves elliptic or ovate:

Flowers spicate above ; bracteoles linear subulate — *Prionitis.*

Flowers mostly solitary, axillary ; bracteoles O or consisting of a few minute bristles ... ... — *cuspidata.*

Capsule with more than 2 seeds ; outer sepals not spine-tipped ; leaves elliptic, obovate or subor-bicular ... ... — *buxifolia.*

Spineless Plants:

Seeds hairy:

Bracteoles longer than or as long as the outer sepals ... ... — *tomentosa.*

Bracteoles shorter than the outer sepals:

Outer sepals spinous ... ... — *cristata.*

Outer sepals not spinous:

Corolla up to 15 cms. long ... ... — *longiflora.*

Corolla 7.5 cms. long or slightly longer:

Corolla white ... ... — *Lawii.*

Corolla blue with reddish-purple tube ... ... — *involucrata* var. *elata.*

Corolla less than 7.5 cms. long:

Inflorescence glabrous; corolla blue or purple; capsule glabrous ... ... *montana.*

Inflorescence strigosely-hairy; corolla blue; capsule glabrous ... ... *strigosa* var. *terminalis.*

Inflorescence glandular-hairy; corolla with blue limb and yellow tube; capsule pubescent at the tip ... ... *courtallica.*

Inflorescence softly villous; capsule glabrous ... ... *sepalosa.*

Seeds glabrous:

Outer seepals up to 5 cms. long; corolla mauve ... *Gibsonioides.*

Outer sepals exceeding 37 mm. long; capsule 37 mm. long, glandular-pubescent; corolla pure white ... ... *grandiflora.*

Outer sepals less than 37 mm. long; capsule up to 22 mm. long, glabrous; corolla pink or purple:

Flowers in terminal spikes or racemes; leaves coriaceous; stems stout ... ... *Gibsoni.*

Flowers solitary, axillary or in very short terminal spikes or recemes; leaves thin; stems slender ... ... *prattensis.*

1. **Barleria prionitis** Linn., Sp. Pl. 636, 1753; Clarke, 482; Graham, 160; Wight, Icon. t. 452; Dalz. & Gibs., 189; Lindau, 314, f.105 C & f. 106 B, & f.125 E; Cooke, 379; Gamble, 1058.

A common shrub, often seen in flower throughout the dry season up to May. At times it grows as a gregarious shrub forming fairly dense clumps up to 3 m. in diam. The flowers are bright yellow, turning whitish with age. In Khandala towards the end of the rains I have seen specimens up to 3 m. high.

O. Kuntze, in Rev. Gen. Pl. 483, splits the species into three varieties; with the first, *pubescens,* I am not concerned, as it is a Central American plant. The other two varieties, *i.e. histryx* (Linn.) O. Kuntze, the glabrous plant of the western parts of India, and var. *heteroclada* O. Kuntze, a plant in which "most leaves are glabrous, those of later shoots silky-tomentose," are in my opinion but two different stages of one and the same plant: the glabrous-leaved form is the common one at the end of the rains and early part of winter, whilst the silky-tomentose, small-leaved form is the plant common during the hotter and drier months of the year; it is a matter of

climate rather than of varietal rank. Among my plants from Khandala I have a large number with the double type of leaves ; these plants have been collected towards the end of December or January. Thus my specimen 5943, January 29, 1945, shows large leaves of 20 × 7 cms. together with numerous smaller ones, scarcely 5 × 1.5 cms. ; all my specimens collected in December-January show the double type of leaves, earlier specimens have all large leaves, whilst later specimens are clad in the small, silky leaves.

Bombay specimens examined (excluding those of Khandala) : *Sedgwick*, Dharwar Dt., Dec. 1916, 2107! Bhor Ghat, Oct. 1921, 7962! *Nana*, Gokak, Belgaum Dt., Febr. 1919, 5445! *Bell*, Ainshi Ghat, N. Kanara, Oct. 1920, 7720! *Acland*, Sonai, Sept., 901! *Santapau*, Kaneri Caves, Jan. 1942, 152/63! Purandhar, Dec. 1944, 5706! *Blatt. Herb.* Matunga, Nov. 1916, 14790! Uran, Jan. 1917, 14798! Dadar-Matunga, Nov. 1915, 14845! Mahim, Dec. 1915, 14856! Purandhar, Dec. 1917, 23035! 23077 ! Andheri, Dec. 1916, 23165! Amoda, Khandesh, Dec. 1918, 27112! Chanseli, Khandesh, Dec. 1918, 27179! Campoli, Concan, Oct. 1918, 77608! All these specimens are kept in Blatt. Herb. In addition I have recorded the plant from every part from Kolhapur to Kathiawar where I have conducted botanizing expeditions.

2. **Barleria cuspidata** Heyne ex Nees in Wall., Pl. As. Rar. 3 : 93, 1832 ; Clarke, 483 ; Wight, Icon. t. 451 ; Cooke, 380 ; Gamble, 1059.

Rather similar to the preceding species, from which it differs by the smaller size of the whole plant, the smaller leaves, but mainly by the inflorescence which consists of solitary, axillary flowers ; its bracteoles are either altogether absent or reduced to mere bistles. A species with the typical appearance of plants from drier districts.

Blatt. Herb. Uran, Jan. 1917, 14839! *Sedgwick*, Yelvigi, Dec. 1916, 2045! Ibid., Febr. 1919, 5369! Sedgwick states that this plant is common on black soil districts.

3. **Barleria buxifolia** Linn., Sp. Pl. 636, 1753 ; Clarke, 483 ; Graham, 160 ; Cooke, 381 ; Gamble, 1059.

A low undershrub, which in the herbarium looks rather pretty ; its leaves are small, often but 1 cm. diam., broad, often orbicular ; petioles very short or O. Rare in Bombay. There is but one sheet in Herb. Kew from Bombay (" Concan, Law ") ; there are none in Blatt. Herb.

4. **Barleria tomentosa** Roth, Nov. Pl. Sp. 314, 1821 ; Clarke, 485 ; Cooke, 382 ; Gamble, 1059.

This is a doubtful native of Bombay, except perhaps in the southern parts ; in Kew Herb. there is only one specimen, that of Dalzell mentioned by Cooke, without locality. This species seems to be fairly common in Madras.

5. **Barleria cristata** Linn., Sp. Pl. 636, 1753 ; Clarke, 488 ; Graham, 160 ; Dalz. & Gibs., 188 ; Cooke, 382.

A rather showy plant with sesile leaves. " A very beautiful shrub when in flower, but rather a scraggy appearance at other times " (Graham, *loc. cit.*). It is very similar to some of the *Lepidagathis ;* the bracteoles are very distinct, pale green with conspicuous veins. Corolla blue.

Nana, Castle Rock, March 1919, 5614! *Bell,* N. Kanara, Nov. 1918, 4906! Karwar, Dec. 1920, 152/11! *Blatt. Herb.:* Victoria Gardens, Bombay, Febr. 1917, 14772! Parel, Nov. 1916, 14805! Turanmal, Khandesh, Dec. 1918, 26813! 27066! 27147!

6. **Barleria cristata** Linn., var. **dichotoma** (Roxb.) Prain, Beng. Pl. 812, 1903 ; Cooke, 383.
B. dichotoma Roxb., Fl. Ind. 3 : 39, 1832 ; Dalz. & Gibs., 188.

Very similar to the typical variety, from which it differs by its white flowers and slightly more robust habit. Often cultivated in gardens, rarely wild, occasionally escaped from cultivation.

Stocks, Penn ! *Sedgwick,* in a coconut garden, Dharwar Dt., Dec. 1916, 1990! Fort, in a ditch, Belgaum, Sept. 1917, 3070! *Acland,* Igatpuri, Dec. 1926, 942! *Blatt. Herb.* Nov. 1916, Parel, 14806! *Hallberg & McCann,* Sampkhand, N. Kanara, Oct. 1919, 34645!

7 **Barleria Lawii** T. Anders. in Journ. Linn. Soc. 9 : 492, 1867 ; Clarke, 486 ; Cooke, 383 ; Gamble, 1060.
B. Beddomei T. Anders. ex Beddome, Icon. 62, t. 258, 1874.
B. longiflora? Graham, Cat. 161, 1839 (non Linn.f., nec Roxb.).

The short description of *B. longiflora* ? given by Graham by itself may refer equally well to *B. longiflora* Linn. f., *B. grandiflora* Dalz. and *B. Lawii* Anders.; but Graham also mentions that it " grows about Khandala ; a very ornamental shrub." I have often found *B. Lawii* about Khandala in October and November, but in spite of intensive

search have failed to find either *B. grandiflora* or *B. longiflora;* for this reason I have no hesitation in identifying Graham's plant as ***B. Lawii*** T. Anders.

One of the most showy plants on the western Ghats. Flowers pure white, up to 9 cms. long, 6 cms. diam. across the open corolla. It is often taken for *B. grandiflora,* from which it differs *inter alia* by the rounded corolla lobes and in general smaller flowers. The specimens in Kew Herb., however, seem to have much smaller flowers than the plants I have often seen and examined in Khandala, where the plant is rather common. When the corollas are dry, as in herbarium specimens, they are clearly nerved.

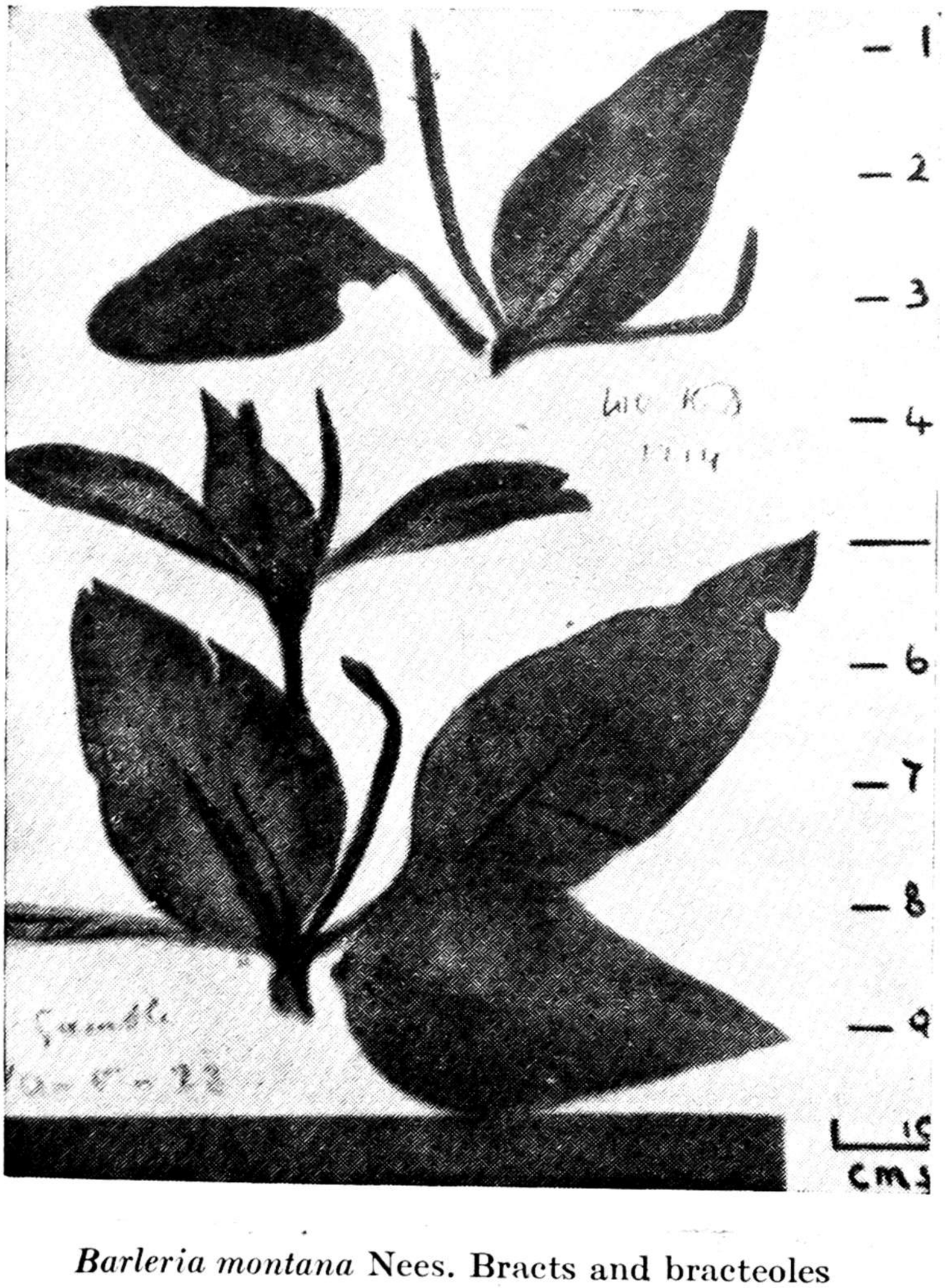
In addition to Khandala specimens, I have examined the following in Bombay: *Sedgwick,* Bhor Ghat, Oct. 1921, 7961! Sinhgadh Fort, half way up, Oct. 1921, 7952! *Acland,* Khandala Ghat, Oct. 1914, 959! *Blatt. Herb.* Campoli, Konkan, March 1917, 22640! *Santapau,* Kaneri Caves, Jan. 1942, 152/64!

8. **Barleria involucrata** Nees var. **elata** (Dalz.) Clarke in Fl. Brit. Ind. 4 : 486, 1884 ; Cooke, 383.
B. elata Dalz. in Kew Journ. Bot. 3 : 227, 1851 ; Dalz. & Gibs., 189.

The flowers are rather similar to those of *B. Lawii* and *B. grandiflora,* and about as large as the latter ; the colour, however, it blue or purplish. Seems to be a rare plant. The type of inflorescence is much more paniculate than in either of the commoner species.
Nana, Castle Rock, by the side of a stream, March 1919, 5621!

Barleria montana Nees in Wall., Pl. As. Rar. 3 : 92, 1832 ; Clarke, 487 ; Dalz. & Gibs., 189 ; Cooke, 384 ; Gamble, 1061. Omnes pro parte.

According to Clarke, this plant has often been mixed with *B. gibsoni* from the time of Wight. The confusion, as I have been able to ascertain, is much earlier than that: it starts from Wallich or from Nees in 1832. On the type sheet of Nees' *B. montana* (Wallich 2391) there are two different plants, of which only the top left-hand corner one can bear Nees' name ; the other species on Wallich's sheet are my own *B. prattensis ;* the plant described and figured by Beddome in Icon. t. 257 is my new species, not *B. montana ;* this plant does not occur in Bombay State, or at least I have failed to find a single authentic specimen. The flowers are said to be bright blue ; the seeds, as shown in several specimens dissected by Gamble in Kew Herb., are



Barleria montana Nees. Bracts and bracteoles

densely hairy with long, wavy hairs and much larger than those of *B. Gibsoni*, or *B. prattensis*, both of which have glabrous, black, shining seeds. The specimens mentioned by Cooke under *B. montana* from Bombay, all belong to my new species. Until further evidence be gathered, therefore, *B. montana* must be excluded from the plants of Bombay.

9. **Barleria strigosa** Willd. var. **terminalis** (Nees) Clarke, in Fl. Brit. Ind. 4 : 490, 1884 ; Cooke, 384.
B. terminalis Nees in DC., Prodr. 11 : 225, 1847 ; Dalz. & Gibs., 188.
B. cerulea Graham, Cat. 161, 1839.

" Khandala Ghat, and in garden hedges about Khandala village. This is a shrub worthy of cultivation, on account of its showy flowers." (Graham, *loc. cit.*) A shrub that may reach up to 3 m. high and about as much in diam. ; when in full bloom it is an attractive plant, but otherwise it looks rough and wild ; the flowers are of a pale blue.

In Blatt. Herb. there are numerous sheets from Khandala ; I have not seen the plant in any other locality. Acland collected it from Mahableshwar in Oct. 1924 (Acland 943!).

B. strigosa var **polystachya** (Nees) Clarke in Fl. Brit. Ind. 4 : 490, 1884 ; Cooke, 385.
B. polystachya Nees in DC., Prodr. 11 : 226, 1847.

" Leaves very large, fulvous-hirsute above, somewhat glaucescent beneath, spikes densely agglomerated yellow-hirsute." Clarke, *loc. cit.* I have not seen this plant in Bombay, though Clarke gives it on the authority of Stocks, who found it in the Konkan.

10. **Barleria courtallica** Nees in DC. Prodr. 11 : 226, 1847 ; Clarke, 489 ; Wight, Icon. t. 1529 ; Dalz. & Gibs., 188 ; Cooke, 385 ; Gamble, 1060.
The colour of the corolla, blue in the limb and yellow in the tube, seems to be a distinguishing mark of this plant ; for the rest it is rare in Bombay.
Sedgwick, Yellapur, April 1919, 5837!

11. **Barleria sepalosa** C. B. Clarke, in Fl. Brit. Ind. 4 : 487, 1884 ; Cooke, 385.

The only specimens in Kew Herb. are the type sheets, on which see Cooke's remarks, *loc. cit*. In general appearance it is rather similar

to *B. Gibsoni*, but for the sepals which are larger, hairy and acute. Seems to be a very rare plant.

12. **Barleria grandiflora** Dalz. in Kew Journ. Bot. 2 : 339, 1850 ; Dalz. & Gibs. 189 ; Clarke, 488 ; Cooke, 386.

This is the largest-flowered of the Bombay Barlerias ; corolla pure white, up to 11.5 cms. long, 8 cms. diam. ; it seems to be fairly rare. It is often confused with *B. Lawii ;* the differences between these two plants are:

Grandiflora	*Lawii*
Corolla 11.5 cm. long, 8 cms. diam.	Corolla up to 9 cm. long, 6 cm. diam.
Corolla lobes acute or subacute.	Corolla lobes rounded.
Dry corollas slightly nerved.	Dry corollas conspicuously nerved.

As stated above, I have not seen this plant in Khandala or anywhere else within the present limits of Bombay State.

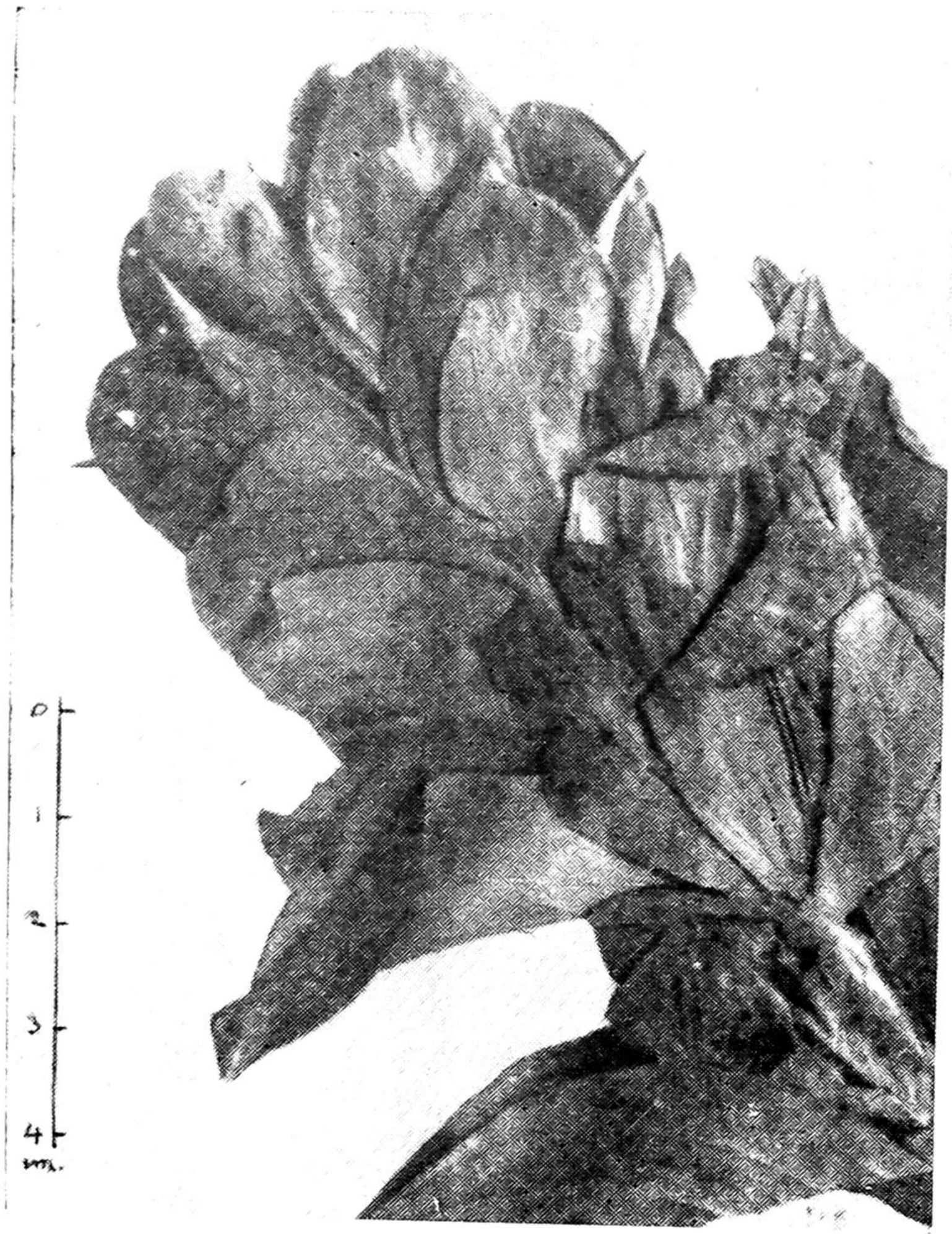
13. **Barleria Gibsoni** Dalz., in Kew Journ. Bot. 2 : 339, 1850 ; Dalz. & Gibs., 189 ; Clarke, 487 ; Cooke, 386 ; Gamble, 1061 (an pro parte?).

Clarke, *loc. cit.*, states that this plant is often mixed with *B montana ;* the real confusion is not so much with the true *B. montana* as with *B. prattensis*. For the differences between these species, see under the next species.

B. Gibsoni seems somewhat rare in western India ; I have seen it growing fairly abundantly on the higher ground around Purandhar Fort only. *Acland,* Kolhapur, at 3000 ft., Sept. 1920, 902! *Blatt. Herb.,* Purandhar, Jan. 1918, 23180! 23179! *Santapau,* Purandhar, Dec. 1944, 5758! 5759! Ibid., Jan. 1945, 5777! 5778! Ibid. Dec. 1945, 8282!

14. **Barleria prattensis** Santapau, in Kew Bull. 1948 : 487, 1949.

The following is the translation of the original description: "Very similar to *B. montana,* from which it differs by its much shorter bracteoles and its smaller and glabrous seeds ; similar also to *B. Gibsoni,* from which it differs by its smaller seeds, its inflorescence which is axillary and only very shortly spicate or racemose, and by the structure of the leaves.



Barleria Gibsoni Dalz. Terminal spike.

" Stems and branches terete or more or less quadrangular, glabrous or subglabrous, with long internodes. Leaves 6 – 12 × 2 – 5 cm., membranous, ovate or elliptic, entire, glabrous or subglabrous, minutely punctate, with numerous raphides irregularly scattered on the upper side, attenuated at the apex and base, decurrent into the petiole ; secondary nerves 5 – 6 pairs, each making with the midrib an angle of 60 degrees ; petiole 0.5 – 2 cms. long, often however obscure on account of the decurrent blade.

" Flowers solitary, axillary, opposite or collected into a very short terminal spike or raceme ; pedicels 0 – 4 mm. long, with two bracteoles about the middle. Bracteoles linear or subulate, the lower ones at times subspathulate, all acute, more or less arcuate, 6 – 13 mm. long, rarely longer, pubescent or subglabrous, with a conspicuous mid nerve, margins ciliate, scarious.

" Exterior sepals foliaceous, up to 37 × 20 mm., subequal or clearly unequal, ovate ; the larger sepal acute or subacute, the smaller one obtuse or subobtuse and generally entire, rarely shortly 2-fid ; both sepals glabrous or subglabrous, somewhat hairy near the apex. Interior sepals 10 – 15 mm. long, linear-lanceolate, very acute, pubescent or subglabrous. Corolla up to 8.5 cms. long, glabrous ; tube 3 – 4.5 cms. long ; lobes obovate, obtuse, subequal, or one of them suborbicular, the rest obovate, all up to 20 mm. long. The corolla in Khandala is always rosy-purple. Stamens 2, staminodes 2 without anthers. Capsule brown, glabrous, up to 20 mm. long, attenuated at the apex, 4-seeded in the lower part. Seeds black or blackish, orbicular, much compressed, about 4 mm. diam., 0.5 mm. thick very rarely thicker."

This is a common plant in Khandala and elsewhere in Bombay State ; all the specimens mentioned by Cooke under *B. montana* belong to this new species, none of them is the real *B. montana.* In addition to the Kew specimens I have seen the following sheets from Bombay: *Sedgwick,* Yellapur, N. Kanara Nov. 1917, 3148! *Saxton,* W. Ghats, 1915, 7774! *Acland,* Trombay, Sept. 1925, 899! 898! Idem, Dapoli, Sept. 1922, 900! Idem, Bandradara, Oct. 1934, 1425! *Blatt. Herb.,* Karjat, Oct. 1918, 28402! Campoli, Konkan, Oct. 1918, 28331! *Santapau,* Jogeshwari, Oct. 1941, 152/26! Tansa Lake, Sept. 1943, 2695! 2708! Andheri, Sept. 1944, 4940! Andheri, Sept. 1945, 7365! In addition I have collected numerous specimens from Khandala, where the plant is rather common.

montana	*Gibsoni*	*prattensis*
Flowers bright blue.	Flowers pink-purple.	Flowers purple or rosy-purple.
Flowers solitary, axillary.	Flowers in spikes or racemes, terminal.	Flowers solitary, axillary.

montana	*Gibsoni*	*prattensis*
Bracteoles 2 cms. long, spathulate, broad.	Bracteoles 1 – 1.5 cm. long, linear.	Bracteoles 1 cm. long linear.
Seeds large, greyish hairy, wavy.	Seeds large, black, shining, thick.	Seeds small, black, shining, thin.
	Lateral nerves of leaves at 30 – 40° to midrib.	Lateral nerves of leaves at 60° to midrib.
Leaves membranous.	Leaves coriaceous.	Leaves membranous.
Madras plant.	Bombay plant.	Bombay plant.

15. **Barleria longiflora** Linn.f., Suppl. 239, 1781 ; Clarke, 485 ; Talbot, For. Fl. 2 : 336 ; Gamble, 1056.

"Gregarious in 2 or 3 localities near the ghat road between Poona and Mahableshwar. Noted for the first time in the Bombay Presidency." Talbot, *loc. cit.*

The following description has been compiled from Clarke and Gamble, 11.cc.: Shrubs or undershrubs without spines, 60 – 110 cms. high, pubescent ; leaves up to 45 × 25 mm., subacute or acute, ovate-deltoid, or ovate, closely grey-tomentose, base rounded, margins entire, petioles 6 – 12 mm. long. Flowers in short, dense, few-flowered (1 – 4) spikes or solitary ; bracteoles 12 – 25 mm. long, 2.5 mm. broad, laxly patent, softly pubescent. Sepals: the two outer ones ovate, obtuse at the base, pale and scarious in fruit and prominently reticulate with spreading nerves, 18 – 25 × 12 mm. Corolla tube very slender, cylindric to near the top, up to 15 cms. long, lobes ovate, about 12 mm. long. Capsule 4-seeded, seeds with appressed hairs.

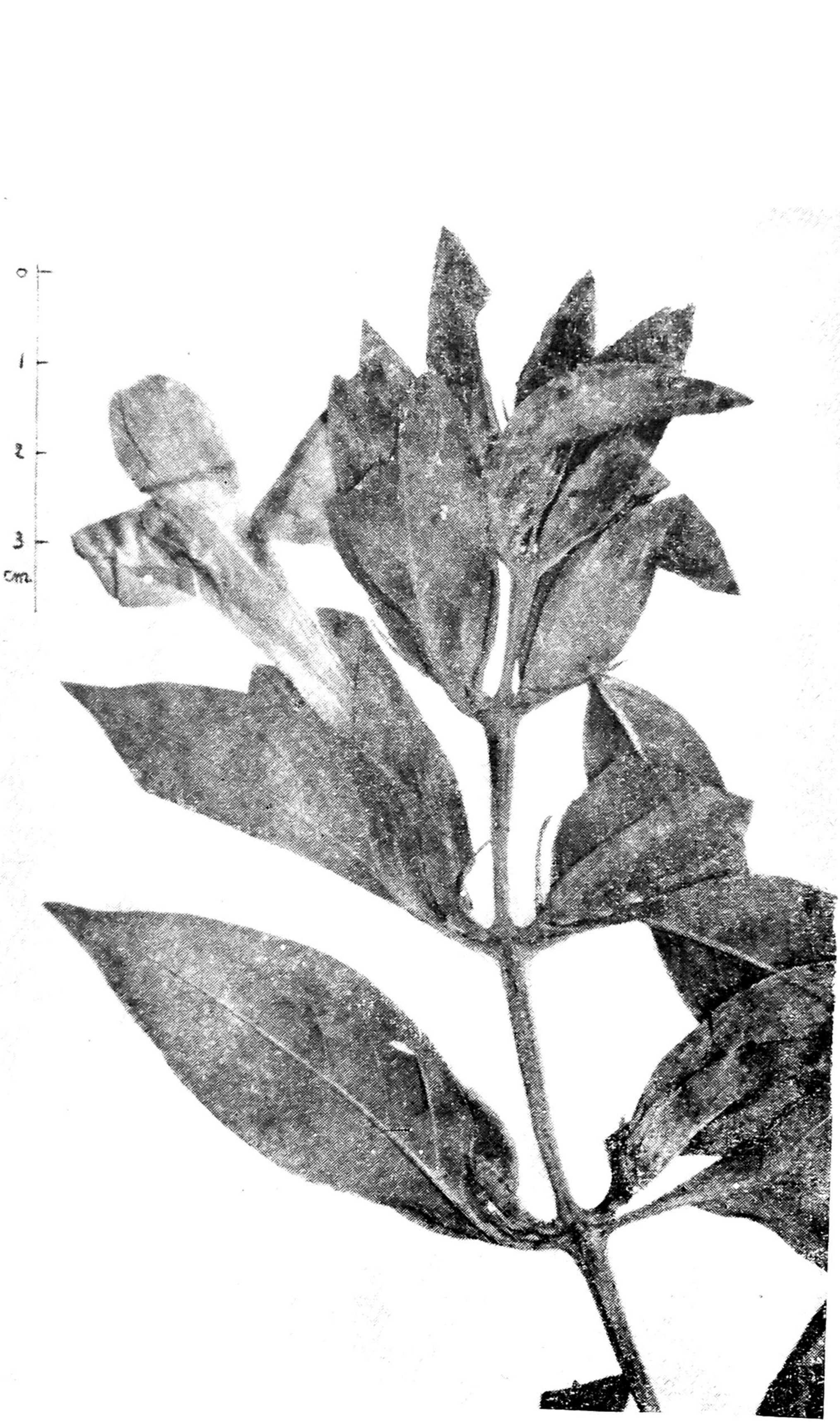
I have seen no specimen from Bombay ; there are none in Blatt. Herb. The plant is given on the authority of Talbot, *loc. cit.*

16. **Barleria Gibsonioides** Blatter in Journ. Bomb. Nat. Hist. Soc. 32 : 733, 1928.

The following is the original description of Blatter, the first paragraph being a translation from the Latin:

"Acanthacea of the section *Eubarleria*, similar to *B. Gibsoni* Dalz. from which it differs by the bracts which are always rounded at the base, the interior sepals being glabrous and ciliolate at the margins, the corolla not at all glabrous, the seeds discoid and of the same colour as the corolla.

A tufted undershrub, up to 1 m. high, very leafy. Stems quadrangular very obscurely winged, stiff, erect, light green ; internodes thickened above the leaves. Leaves glabrous, except the margin which is finely spinous-hairy, leathery or papery, somewhat rigid, lowest broadly ovate or almost rounded, obtuse at the tip, lamina up to 14



Barleria prattensis Santapau. Branch with inflorescence

cms. by up to 10 cms., the rest ovate-oblong or oblong, acuminate, up to 20 cms. by 8 cms., very variable in size and shape, shining-green above, glaucous beneath, base rounded or tapering, main nerves up to 7 pairs, depressed and whitish above, prominent beneath ; stalks of lowest leaves up to 4 cms. long, getting shorter upwards. Flowers in dense, imbricate, terminal spikes, rarely solitary, axillary ; spikes more or less 10 cms. long in flower. Bracts foliaceous, the lowest O or two pairs resembling the leaves and up to 10 cms. long, the rest getting rapidly shorter upwards and shorter than the calyx, broadly elliptic-lanceolate, acute, broadly rotund at the base, pale-green. Bracteoles at base of stalkless flower, linear, boat-shaped, subacute, glabrous on both surfaces, margin ciliolate, up to 2 cms. by 2 mm. Outer sepals 2, ellipsoid, rounded at base, up to 5 cms. long and 2 – 2.5 cms. broad, often exactly alike as to size and shape, but one generally slightly shorter and subacute at the apex, the other acute, both distinctly nerved, quite glabrous; glaucous on the lower surface, pale-green and shining on the upper ; inner sepals 2, narrowly linear-lanceolate, acuminate, boat-shaped, up to 15 mm. long. 2 – 3 mm. broad, glabrous, with ciliolate margin. Corolla 6-10 cms. long, minutely glandular-hairy on the margin and tube, sparingly so on the surface of the lobes ; tube 4-5 cms. long, enlarged upwards, dark purple inside and outside, lobes obovate or ellipsoid, rounded at the apex, delicately veined, mauve (light and dark), the 2 upper lobes each with a large elongated dark purple blotch begining at base of lobe and extending 15-20 mm., blotches sometimes faint or absent. Stamens 2 ; filaments white in the lower part, mauve in the upper ; anthers voilet ; pollen globose, white. Staminodes 3, without anthers. Base of stamens and staminodes minutely glandular-hairy. Style filamentous, white in the lower part, mauve above. Stigma bifid. Unripe capsule oblong, tip conical, shining smooth. Seeds 4, disc-shaped, glabrous (Plate I)...

Locality: Below Godowli, 3 miles from Panchgani, W. Ghats of Bombay Presidency (Blatter Nos. 1, 2, 3, 5, 7 type, 4, 6 co-type). Was in flower during the first half of October 1927."

I have not seen this plant ; there are no specimens in Blatt. Herb.

30. NEURACANTHUS Nees.

Key to the Bombay species of Neuracanthus

Flowers in dense, spherical or globular axillary, occasionally terminal, spikes ... ... *sphærostachyus*
Flowers in elongated, 4-sided spikes ... ... *trinervius.*

1. **Neuracanthus trinervius** Wight, Icon. t. 1532, 1850 ; Clarke, 491 ; Dalz. & Gibs., 190 ; T. Anders., in Journ. Linn. Soc. 9 : 494 ; Lindau, 315 ; Cooke, 387.
Neuracanthus tetragonostachyus Dalz., MS. ined., in Kew Herb. (non Ness).

The type of this species when compared with that of *N. tetragonostachyus* Nees shows very little difference to exist between the two species. The leaves of the latter plant are acute and tapering at both ends, so that they appear petiolate or at least subpetiolate, definitely not sessile. But in my opinion this difference seems to be rather insufficient to build a species on. Clarke writes that *N. tetragonostachyus* "hardly differs from *N. trinervius* except in the greater attenuation of the leaves at both ends." However, against the fusion of the two species there seems to stand a strong reason: both species seem to be endemic, one of Burma, the other of Bombay, and there are no intermediate or connective forms or localities ; such a separation is very difficult to explain if the two species are fused into one.

In Kew Herb. there is a sheet of *N. trinervius* Wight with a spike 18 cms. long, this being longer than any spike which I have seen in the field.

Sedgwick, Konankeri, Dharwar Dt., Febr. 1918, 3719 ! Arbail Ghat, N. Kanara, Dec. 1918, 5015! *Bell*, Thana forest, N. Konkan, Febr. 1918, 3860! *Blatt. Herb.*, Ghatkopar, Nov. 1918, 28752! Penn, Colaba Dt., Febr. 1917, 22819! Kaneri Caves, Nov. 1918, 28933! The plant is particularly common in Khandala on the slopes below Echo Point, in open situations ; its flowers are of a bright blue. When the plant is in leaf and flower it is an attractive sight ; when the leaves have fallen off, it is a rough-looking plant.

2. **Neuracanthus sphærostachyus** (Nees) Dalz. in Kew Journ. Bot. 2 : 140, 1850 ; Dalz. & Gibs., 190 ; Clarke, 491 ; Cooke, 387 ; Kuntze, 493 ; Lindau, 315.
Lepidagathis sphærostachya Nees in DC., Prodr. 11 : 254, 1847.
Neuracanthus Lawii Wight, Icon. t. 1531 ; T. Anders., 494.

A MS. note of Dalzell in Kew Herb. remarks: "...the flowers are singular being almost quite entire in the limb, which is cup-shaped, and *plicate in æstivation*.-Bracts and calyx grow with the fruit.-The flowers in the rainy season and in consequence of the water being retained by the long bracts, the seeds seldom ripen. I send a paper of seeds which I have been fortunate to find this year for the first time." Clarke, *loc. cit.*, simply remarks: "The plant appears rarely to seed, as Dalzell notes."

The plant is singular in many respects. The flowers appear in axillary spikes which are densely capitate, often the floral heads being 12 cms. diam. After the leaf-fall, the floral heads stand out very conspicuously on the stem, and both stem and floral heads persist till the following monsoon, often even in cases where the ground has been burnt or fired and everything else has perished in their neighbourhood.

My experience in Khandala is that the plant seeds quite freely and easily ; otherwise, it would be difficult to account for the great abundance of the plant which in places grows in very large and dense patches. On several occasions I have noticed that seeds take a long time to form, and that many perish in the summer fires ; when finally the monsoon comes at the beginning of June, many seeds germinate at once *in situ, i.e.* whilst still on the parent plant. Seeds are regularly formed, but it is only late in the season that they appear.

Saxton, Modasa nr. Ahmedabad, Sept. 1915, 1084! *Sedgwick,* Mumbra Sept. 1919, 7656! *Bell*, Sulgeri, N. Kanara, Aug. 1918, 4263! *Blatt. Herb.* Prim Isl., Gulf of Cambay (without number)! Chanseli Hill, Khandesh, Dec. 1918, 27015! Satara, May 1917, 23879! Igatpuri, Oct. 1917, 23047! 23190! Walkeshwar, Bombay, seashore on rocks, 14852! Malabar Hill, Bombay, Aug. 1918, 15631! Uran, Jan. 1917, 14837! Purandhar, Dec. 1917, 23069! Kaneri Caves, Nov. 1918, 28942! *Acland,* Kolhapur, Aug. 1920, 928! Juhu, Salsette Isld. Dec. 1924, 929! *Santapau,* Jogeshwari, Oct. 1941, 152/28! Versova, seashore, but out of reach of tides, April 1942, 238! Andheri, Aug. 1942, 674! Aug. 1941, 152/18! In addition I have found the plant to be common in Khandala, Purandhar, Mumbra, Karjat, etc., in a word, it is found almost everywhere in Bombay in deciduous forests or on dry open ground.

31. ASYSTASIA *Blume.*

In Benth. & Hook., Gen. Pl. 2 : 1094, the genus *Asystasia* Blume is mentioned as one of the genera of the Acanthaceæ, with, among others, the following main characters: Stamens 4, didynamous, all perfect or the posticous one reduced to staminodes. The presence of only 2 stamens with 2 staminodes characterises the section *Mackaya* (Harv.) Benth. & Hook. Similarly Clarke, Cooke, Gamble, etc. attribute 4 stamens to *Asystasia,* and *Mackaya* is not even mentioned in their books. I find, however, that in the recent Flora of Assam the name *Mackaya* Harv. has displaced *Asystasia* altogether probably under the mistaken notion that since *Mackaya* is a nomen conservandum, *Asystasia* must disappear. It is to be noted, however, that the name *Mackaya*

Harv. has been listed among the "nomina conservanda" in place of *Mackaya* Arn.. ; there is no mention in the Rules, Append. 3, no. 8039 of *Asystasia* as "nomen rejiciendum." It is clear then that the authority of the Rules cannot be invoked by the authors of the Flora of Assam for one of their rather clumpsy changes of names.

Key to the Asystasia species of Bombay (adapted from Gamble)

Bracts very small ; inflorescence secund consisting of lax racemes:

Branches and leaves grey-puberulous ; bracts 3 mm. long ... ... *gangetica.*

Branches and leaves green, glabrous or slightly pubescent ... ... *Dalzelliana.*

Bracts and bracteoles large, membranous ; inflorescence of close spikes ... ... *mysurensis.*

1. **Asystasia gangetica** (Linn.) T. Anders. in Thw., Enum. 235, 1859-64 ; Lindau, 326, f.131 ; Gamble, 1063 ; Bremek. in Rec. Trav. Bot. Neerl. 35 : 161, t.15 E.

Justicia gangetica Linn., Amoen. Acad. 4 : 299, 1759.

Asystasia coromandeliana Wight ex Nees in Wall., Pl. As. Rar. 3 : 89, 1832 ; Nees in DC., Prodr. 11 : 165 ; Clarke, 483 ; Wight, Icon. t. 1506 ; Dalz. & Gibs., 186 ; Cooke, 388.

A. violacea Dalz. in Kew Journ. Bot. 2 : 139, 1850 (non Dalz. ex Clarke, 1884).

A. zeylanica Koen. ex Roxb., Fl. Ind. 3 : 42, 1832 ; Graham, 161.

Sedgwick, Shiggaon, Dharwar Dt., Dec. 1916, 2096! Dharwar, Sept. 1917, 2885! *Acland,* Brahamapuri, Kolhapur, Sept. 1920, 926! *Santapau,* Sion Hill, Bombay, July 1941, 151/27! Ghatkopar, Aug. 1945, 7009! 7010! *Blatt. Herb.* Basein, Sept. 1917, 23356!

2. **Asystasia Dalzelliana** Santapau, in Kew Bull. 1948 : 276.

A. violacea Dalz. MS. ex C. B. Clarke, in Fl. Brit. Ind. 4 : 494, 1884, (non Dalz., 1850) ; Cooke, 389 ; Gamble, 1063.

A. coromandeliana Bot. Mag. t. 4248 (non Wight).

Ruellia filiformis Heyne in Herb. Rottl., ex C. B. Clarke, *loc. cit.*

The name *A. violacea* Dalz. 1884 is an illegitimate one, since it is a later homonym, and was first published for a plant which, according to Clarke and Cooke, is distinct from the present species. The oldest name would appear to be that of *Ruellia filiformis* Heyne, but this name was only published in the synonymy of the present plant by Clarke, and such a method of publication has been declared invalid by the Rules, Art. 40. I have called the plant after Dalzell, who was the first to call attention to the plant as being distinct from the preceding species.

It is not easy to separate this species from *A. gangetica,* as may be seen from a study of the synonymy of both plants. In general *A. Dalzelliana* has much larger leaves, and these are attenuated into a long petiole ; the racemes are terminal ; the calyx is ciliate with long hairs and is about 10 – 12 mm. long ; moreover, geographically *A. gangetica* is a coastal species, whilst *A. Dalzelliana* is a rain-belt species from the hills.

Sedgwick, Mahableshwar, 4500 ft., Nov. 1918, 4594! *Bell,* Sulgeri, N. Kanara, Aug. 1918, 4284! *Sedgwick,* Devarayi, 1800 ft., July 1918, 4094! Nagayali, N. Kanara, 2000 ft., Sept. 1917, 2986! *Nana,* Mahableshwar, Oct. 1920, 7594! *Acland,* Dapoli, Aug. 1922, 927! *Santapau,* Purandhar, Aug. 1945, 7112! Sept. 1945, 7238! 7287! It is a common plant in the undergrowth in Khandala.

3. **Asystasia mysurensis** (Roth) T. Anders, in Journ. Linn. Soc. 9 : 524, 1867 ; Bremek, in Mat. Mon. Strob. 280, 1944.
Ruellia mysurensis Roth, Nov. Pl. Sp. 303, 1821.
Strobilanthes mysurensis Nees in Wall., Pl. As. Rar. 3 : 86, 1832 & in DC., Prodr. 11 : 192, 1847.
Asystasia lawiana Dalz. in Kew Journ. Bot. 4 : 344, 1852 ; Dalz. & Gibs., 186 ; Clarke, 496 ; Cooke, 389 ; Gamble, 1064.

In Kew Herb. there are several sheets of this species. On the cover or the type sheet Clarke wrote in 1895: "is a Lepidagathis." On the same cover Gamble added: "Dr. Cooke, considered it an Asystasia (see Fl. Bomb.) and I agree. J. S. Gamble." On a sheet in Wight's Herbarium Nees wrote: "Strobilanthes mysurensis N. ab E. in Wall. Pl. As. Rar." Clarke has corrected this to "Asystasia Lawiana Dalz."; Gamble agrees with Clarke. This shows that the present species is a difficult one ; the specimens from Bombay which I have examined look quite different from any of the commoner Asystasias. "Very unlike the genus in the bracts, corolla, anthers and habit, in which it more resembles *Strobilanthes micranthus.*" (Clarke in Fl. Brit. Ind. 4 : 496). A rare plant in Bombay State.

Sedgwick, Tadao, Dharwar Dt., Dec. 1916, 1934! Dharwar, July 1917, 2661! *Bell,* Poona, July 1919, 6158!

32. PSEUDERANTHEMUM Radlk.

On the question of the generic name and its relations to allied plants, see above under *Eranthemum* Linn.

Key to the Bombay wild or cultivated species :

Corolla lobes obovate-oblong, rounded ; capsules glandular-pubescent ... ... *malabaricum.*
Corolla lobes ovate-oblong, rounded or subacute ; capsules glabrous ... ... *bicolor.*

1. **Pseuderanthemum malabaricum** (Clarke) Gamble, in Fl. Madr. 1064, 1924.
Eranthemum malabaricum Clarke, in Fl. Brit. Ind. 4 : 497 ; 1884 ; Cooke, 390.
E. crenulatum Wall., Cat. 2491, 1830 ; Dalz. & Gibs., 195 (non Lindley).

Rather rare in Bombay. At its best, this plant looks scraggy and bare ; its leaves are mostly collected towards the ends of the branches, the flowers are small and not very conspicuous, and very easely deciduous.

To the localities mentioned by Cooke, the following must be added from the evidence in Blatt. Herb. : *Bell,* Guddehalli, N. Kanara, March 1919, 5738 ! Arbail Ghat, July 1920, 7858 ! *Santapau,* Khandala, August 1945, 8687-8690 !

2. **Pseuderanthemum bicolor** (Schrank) Radlk., ex Lindau in Pfam. 4 (3B) : 330, f. 133 A-D, 1895.
Eranthemum bicolor Schrank, Pl. Rar. Hort. Monac. t. 8, 1819 ; Cooke, 390.
E. pulchellum Hort., in Gartenmag. 176, t. 17, 1810 (non Andr., 1800, nec Roxb., 1832).
Pseuderanthemum pulchellum Merr., in Phil. Journ. Sci., Bot., 7 : 218, 1912 ; id. in Enum. 3 : 482, 1924.

Merrill made the combination *Pseud. pulchellum* on the ground that the specific epithet *pulchellum* was older than *bicolor,* since they date from 1810 and 1819 respectively. With this I cannot entirely agree ; the name *Eranthemum pulchellum* Hort. is a later homonym of *Eranthemum pulchellum* Andr., which is applied to a different plant ; the name, therefore, on which Merrill based his combination was an illegitimate one ; the oldest legitimate name for this plant is that of Schrank, and the present name should, therefore, be *Pseud. bicolor* (Schrank) Radlk.

A small shrub, rather similar to *E. malabaricum,* cultivated in gardens, but not wild in Western India ; its flowers are, moreover, somewhat larger than those of the wild species.

33. LEPIDAGATHIS Willd.

Key to the Bombay Species of Lepidagathis :

Seeds 2:
  Calyx 4-partite:
    Bracts spinous-pointed:
      Inflorescence mostly in globular radical heads ... *cristata.*
      Inflorescence mostly in 4-sided, simple terminal spikes ... ... *clavata.*
    Bracts not spinous-pointed ... ... *mitis.*
  Calyx 5-partite:
    Leaves spinous-pointed ... ... *prostrata.*
    Leaves not spinous-pointed:
      Bracteoles uniform:
        Bracts glabrous, with long, recurved spines ... *trinervis.*
        Bracts softly hairy with straight, apical spines *lutea.*
      Bracteoles dimorphous ... ... *bandraensis.*
Seeds 4:
  Leaves long, linear-lanceolate, longitudinally folded ... *rigida.*
  Leaves shorter, not longitudinally folded:
    Erect undershrub, leaves entire ... ... *cuspidata*
    Prostrate herbs:
      Leaves entire or nearly so ... ... *incurva* var. *mucronata.*
      Leaves crenate or crenate-serrate ... ... *fasciculata.*

1 **Lepidagathis cristata** Willd., Sp. Pl. 3 : 400, 1801 ; Clarke, 516 ; Graham, 160 ; Wight, Ill. t. 164, f.5 & Icon. t. 455 ; Dalz. & Gibs., 191 ; T. Anders., 494 ; Lindau, 313 ; Cooke, 391 ; Gamble, 1066.

Flowers in globose heads, radical or subradical ; sometimes there are a few, much smaller, heads along the branches. Branches procumbent ; leaves linear or oblong. At first sight this plant is very similar to *L. mitis* and *L. trinervis ;* it is, however, a rare plant in Bombay State.

2. **Lepidagathis mitis** Dalz. in Kew Journ. Bot. 3 : 226, 1851 ; Dalz. & Gibs., 191 ; Clarke, 516 ; Cooke, 392 ; Gamble, 1067.

So very closely allied to *L. cristata* Willd. that I confess myself unable to distinguish between these two species. Gamble (p. 1065) gives the following differences:

Bracts and bracteoles long spinous-mucronate, the bracts broadly ovate ; lower calyx-lobes joined to

about half-way up ; leaves linear-oblong, lineolate, nearly glabrous, up to 1.25 in. long, .25 in. broad *cristata.*

Bracts and calyx-lobes shortly spinous-mucronate, the bracts broad, obtuse ; lower calyx-lobes joined to near the top ; leaves oblong or obovate, scabrous on the 5-6 pairs of nerves beneath, ciliate, up to 1.5 in. long, .4 in. broad ... ... *mitis.*

In view of the difficulty in identification, I shall not give references to Blatt. Herb. ; the specimens of these two species seem to me to be hopelessly confused ; from the specimens in Kew Herb., *L. mitis* seems to be more common in Bombay than the other species, but then I am not sure of the proper identification of the Kew specimens.

3. **Lepidagathis trinervis** Wall. ex Nees in Wall., Pl. As. Rar. 3 : 96. 1832 ; Clarke, 517 ; T. Anders. 495 ; Cooke, 393.

The habit of this plant is very similar to that of the two preceding species, but the plant is quite distinct on account of the glabrous or subglabrous inflorescence and the shape of the bracts: these are very broad, almost orbicular, glabrous or nearly so, with a long cuspidate acumination, which often is recurved ; the bracts, moreover, are often purplish in colour. The floral heads may be gathered at the base of the stem, as the other two species, or in addition they may be scattered along the branches. It is a common plant in Bombay and Salsette Islands, Khandala, Karjat, etc. on rocks or on dry ground.

Bell, Thana Dt., Febr. 1918, 3781! *Saxton,* Talod, Oct. 1914, 540! North Gujerat, 1919, 7773! *Sedgwick,* Khandala, April 1921, 7974! *Nana,* Ahmednagar, Sept. 1919, 6347! *Acland,* Trombay, Sept. 1925, 945! Marma Goa, Jan. 1932, 957! *Santapau,* Worli Hill, Sept. 1949, 10309! Uran, Nov. 1942, 1362! Borivli to Kaneri Caves, Jan. 1942, 152/65! Karjat, Nov. 1943, 3146! *Blatt. Herb.* Kaneri Caves, Nov. 1918, 28642! 28638! Uran, Jan, 1917, 14834! 14835! 14840! 14842 ! Bandra, Nov. 1916, 22858 ! Lonavla, Sept. 1918, 27987 ! Bombay, April 1916, 17384! Umella, Khandesh, Dec. 1916, 23114! Turanmal Khandesh, Dec. 1918, 20939! Deolali, Sept. 1917, 23349! Igatpuri, Oct. 1917, 23037! 23031!

4 **Lepidagathis trinervis** var. **asperrima** Clarke, in Fl. Brit. Ind. 4 : 517, 1885 ; Cooke, 393.

Cooke is of opinion that this plant should have specific rank ; it is stouter than any other specimen from Bombay, with much smaller leaves. It is possible, however, that such a structure be due to climatic conditions ; with only one sheet to judge from, it is somewhat rash to try and decide the question.

5. **Lepidagathis lutea** Dalz. in Kew Journ. Bot. 2 : 139, 1850 : Dalz. & Gibs., 190 ; Clarke, 517 ; T. Anders., 495 ; Cooke, 393.

Similar to the preceding species, but with 1 – 3 spikes in many of the axils, in addition to a larger, subradical one ; bracts much larger than in any of the several preceding species, outer ones leaf-like, green and up to 5 cms. long. Corolla yellow. Seems to be endemic in the southern districts of Bombay State.

Blatt. Herb. 23850! *Acland,* Jan. 1922, Dapoli, 946!

6 **Lepidagathis clavata** Dalz. in Kew Journ. Bot. 2:340, 7850 ; Dalz. & Gibs., 191 ; Clarke, 518 ; T. Anders., 495 ; Cooke, 394.

One of the most typically distinct species of *Lepidagathis ;* spikes are stout, elongate, terminal, with an occasional rather weak radical spike ; terminal spikes up to 10 cm. long. This plant, too, seems to be endemic in Bombay State. There are no specimens in Blatt. Herb. ; I have seen no other specimens than those in Kew Herb.

7. **Lepidagathis prostrata** Dalz. in Kew Journ. Bot. 2 : 138, 1850 ; Dalz. & Gibs., 190 ; Clarke, 518 ; Cooke, 395.

Stems commonly prostrate and rooting at the lower nodes, occasionally erect or suberect ; spikes dense, erect even when the stems are prostrate.

Sedgwick & Bell, Mirjan, N. Kanara, Oct. 1917, 6882! Nov. 1917, 6850 ! *Hallberg & McCann,* Mirjan, laterite flats, Oct. 1919, 34152 !

8. **Lepidagathis rigida** Dalz. in Kew Journ. Bot. 2 : 341, 1850 ; Dalz. & Gibs., 191 ; Clarke, 518 ; Cooke, 395.

An erect, shrubby plant, up to 1 m. high ; leaves up to 15 × 1.2 cms., glandular-pubescent. In general outline it is somewhat similar to *Asteracantha longifolia ;* the flowers, however, are in dense glandular-hairy, cylindric spikes, which are terminal on very short lateral branches. Capsules 4-seeded. The specimens in Kew Herb. show leaves up to 15 × 1.5 cms.

9. **Lepidagathis cuspidata** (Wall.) Nees in Wall., Pl. As. Rar. 3 : 97, 1832 ; & in DC., Prodr. 11 : 258, 1847 ; Clarke, 519 ; Bedd., Icon. t. 227 ; Cooke, 396 ; Gamble, 1067.
Ruellia cuspidata Wall., Cat. 2405, 1830.

A variable plant ; generally erect with rather large leaves ; occasionally more or less procumbent. It is often parasitised by *Striga*

gesneroides Vatke during the second part of the rains and early part of winter. This is about the commonest species of this genus about Bombay. During the dry season, when the plant appears leafless, it has a savage look with its strongly armed spikes. In Khandala and on Purandhar Hill I have seen it growing in very dense patches, at times up to 100 × 25 m. in pure formations to the exclusion of every other plant ; the stems and leaves may be green or purplish, especially when old ; it is a difficult plant to handle on account of the spinous bracts.

O. Kuntze, Igatpuri, Dec. 1875, 7543! *Sedgwick,* Matheran, Dec. 1920, 7697! Kala Naddi, N. Kanara, May 1917, 2499! Supa, Kanara, Apr. 1918, 3886! Ainshi, N. Kanara, Apr. 1918, 3887! Mahableshwar, Nov. 1918, 4563! Ibid., March 1920, 7336! *Nana,* Mahableshwar, May 1920, 7336! Dhudhsagar, March 1919, 5674! *Bell,* Guddehalli, Karwar, Dec. 1920, 7841! 7809 ! Ahwa, Dangs, Febr. 1919, 5690! Satpuras, Khandesh, Dec. 1918, 4991! *Acland,* Sion, Dec. 1926, 951! *Santapau,* Purandhar, Dec. 1944, 5652! 5653! Dec. 1945, 8279! *Blatt. Herb.* Purandhar, Dec. 1917, 23173! Parsik Hill, Dec. 1918, 28921! Turanmal, Khandesh, Dec. 1918, 27296! Penn, Colaba Dt., Febr. 1917, 23807! Sion, Bombay, Febr. 1917, 16982! Uran, Jan. 1917, 14081! Lohagad Hill, Poona Dt., Oct. 1918, 28324!

10. **Lepidagathis incurva** Don, Prodr. 119, 1825, var. **mucronata** Clarke ex Cooke, Fl. Pres. Bombay 2 : 397, 1904.
Ruellia mucronata Wall., Cat. 2366, 1830.
L. mucronata Nees in Wall., Pl. As. Rar. 3 : 95, 1832 & Lepidag. Ill. Monogr. 11, 1841, & in DC., Prodr. 11 : 250, 1847.
L. hyalina Ness in Wall., Pl. As. Rar. 3 : 95, 1832, var. *mucronata* Clarke in Fl. Brit. Ind. 4 : 521, 1885 ; Gamble, 1068.

The name *L. incurva* is seven years older than Nees' *L. hyalina ;* Index Kewensis, however, gives the latter name as valid and the former as a synonym of *L. hyalina.* I have been unable to find the reason for this treatment of an older name in favour of a clearly later one. In consequence I have followed Cooke, and adopted the older name.

At first sight this plant is a difficult one to recognise even as a *Lepidagathis ;* the spikes are terminal or axillary, rather small, with bracts and bracteoles densely hairy with spreading hairs.

Sedgwick, Ainshi Ghat, April 1918, 3888!

11. **Lepidagathis fasciculata** (Retz.) Nees in Wall., Pl. As. Rar 3 : 95, 1832 & in Lepidag. Ill. Monor. 10, 1841 ; & in DC., Prodr. 11 : 260, 1847 ; Clarke, 522 ; Bedd., Icon. t. 228 ; Cooke, 397 ; Gamble, 1068.

Ruellia fasciculata Retz., Obs. 4 : 28, 1786.
Lepidagathis goensis Dalz. in Kew Journ. Bot. 2 : 340, 1850 ; Dalz. & Gibs., 191.

This species differs from most species of *Lepidagathis* in being a diffuse, soft, villous herb. The only specimens from Bombay which I have examined are those mentioned below ; my own specimen was checked with the type at Kew and found to match perfectly. For the rest this plant is rare in Bombay, except perhaps in the southern portion of the present Bombay State ; it is said to be plentiful in Malabar.

The typical part of the plant are the leaves, which are serrate or crenate-serrate, the only species of the genus with such serrations.

Sedgwick, Ainshi, Apr. 1918, 3885! *Santapau*, Khandala, April 1944, 4103!

12. **Lepidagathis bandraensis** Blatter in Journ. As. Soc. Beng. (N.S.) 26 : 347, 1930.

The following is the translation of the specific characters given by Blatter for his new plant: "Leaves opposite, sessile elliptic-lanceolate, 3-nerved, in the margins and on the midrib beneath spinous-serrulate. Flowers arranged in dense, unilateral spikes. Spikes many, densely fasciculate near the root or a little higher up in the part of the branches which is leafless. Bracts densely imbricate, the fertile ones glabrous, the rest hairy. Bracteoles dimorphous. Calyx 5-partite nearly to the base ; segments spinous at the apex, all very hairy inside, the smallest one also on the margins and, though less densely so, on the outside. Upper lip entire ; lower lip 3-lobed, the middle lobe crisped, the lateral ones waved or subentire. Stamens included. Anthers acuminate at the base. Style hairy at the base and in an ascending line. Capsule 2-seeded, ovate, conico-acute. Seeds covered with white, mucilaginous elastic hairs." On p. 349 Blatter adds: "There is no doubt that this species belongs to the group of *Lepidagathis* which comprises the species *cristata* Willd., *Hamiltoniana* Wall. and *mitis* Dalz. It combines characters which are peculiar to each, but does not agree in the totality of characters with any of them. It is a very distinct species. Apart from many other details it can certainly be distinguished by the dimorphous bracts and bracteoles."

The type specimen, Hallberg 74501 from Bandra, Bombay, seems to have perished, it is not in Blatt. Herb. ; I have seen no specimens of this new species, which is herein included on the authority of Blatter.

34. HYPOESTES R.Br.

Hypoëstes lanata Dalz. in Kew Journ. Bot. 2 : 343, 1850 ; Dalz. & Gibs., 197 ; Clarke, 557 ; T. Anders., 522 ; Cooke, 398.

" Habit very remote from *Hypoëstes,* superficially resembling *Strobilanthes perfoliatus,* but the corolla and stamens are typical *Hypoëstes.*" (Clarke, *loc. cit.*) Stamens 2 ; anthers one-celled, muticous. The flowers and fruits are typically Acanthaceous, but the plant itself may easily be taken for one of the Leguminosæ or such other similar family. The plant seems to be endemic on the Concan Hills ; it is rare in Bombay State.

Dalzell, " Hills of the Concan "! (Type in Kew Herb.). *Dalzell,* Rameshwar, N. Concan! *Law,* Bombay, Hooker 1851! *Dalzell.* " In a patch of old jungle. Flowers from Oct. to February "! *Acland,* Dapoli, Dec. 1921, 916!

35. RUNGIA Nees.

For a key to the species of *Rungia,* see Cooke, p. 399.

1. **Rungia crenata** T. Anders. in Journ. Linn. Soc. 9 : 518, 1867 ; Clarke, 547 ; Cooke, 399.

Spikes dense, 1-sided. " Allied to *R. parviflora* Nees, but with much longer flowerless bracts." (Clarke, *loc. cit.*)

In Kew Herb. there are only three sheets of this plant: *Ritchie* 609, Belgaum! *Stocks,* Concan! *Dalz.,* Goa jungles! There are no specimens in Blatt. Herb. ; the plant seems to be endemic in Bombay.

2. **Rungia parviflora** Nees in Wall., Pl. As. Rar. 3 : 110, 1832 ; & in DC., Prodr. 11 : 469 (excl. syn.), 1847 ; Clarke, 550 ; Lindau, 332 ; Gamble, 1071.
Rungia repens T. Anders. in Journ. Linn. Soc. 9 : 518 pp. (non Nees).
Rungia longifolia Beddome, Icon. t. 266 (non Nees).

This is the typical variety of the species ; according to Clarke, this plant appears to be very rare, in spite of the assertion of Lindau that the plant is found all over India and Ceylon. In the typical variety the fertile bracts are glabrous but for the ciliate margins ; this species does not seem to occur in Bombay, or at least I have seen no specimens of it either in Kew Herb. or in India.

3. **Rungia pectinata** (Linn.) Nees in DC., Prodr. 11 : 469, p.p., 1847 ; Wight, Icon. t. 1547 ; Bremek., in Verh. Akad. Nederl. Wet. Nat. (2) 45(2) : 73.

Justicia pectinata Linn., Amoen. Acad. 4 : 299, 1759 ; Graham, 165.

R. parviflora var. *pectinata* Clarke, in Fl. Brit. Ind. 4 : 550, 1885 ; Cooke, 400 ; Gamble, 1071.

R. polygonoides Nees, in Wall., Pl. As. Rar. 3 : 110, 1832 ; Dalz. & Gibs. 196.

R. parviflora var. *muralis* Clarke, *loc. cit.* 550 ; Cooke, 400.

Very common all over Bombay State. Corolla very small, varying from a deep bright purple-blue to a pale whitish lilac. From examination of many specimens in the herbarium and in the field, I have come to the conclusion that the two varieties of Clarke, *pectinata* and *muralis* cannot be separated, they are merely two different forms of the same plant under varying climatic conditions, *pectinata* with its larger leaves and more robust stem being the rainy season or early winter form, *muralis* with very small leaves and very short stem the dry season form ; or alternatively, *pectinata* is the form found during the moist season or in moist spots during the dry season, *muralis* the form found during the dry season on arid or dry spots, like rocks, walls, etc.

Sedgwick, Castle Rock, Aug. 1917, 2858! Alnavar, Febr. 1917, 2230! Devikop, Dharwar Dt., Nov. 1916, 1870! 1869! Mahableshwar, Nov. 1918, 4746! 4528! *Saxton,* 1915, 7780! W. Ghats, 1914, 7795! *Nana,* Castle Rock, March 1919, 5678! Bandra, Jan. 1920, 7393! *Ezekiel,* Alibag, Febr. 1917, 30338! *Acland,* Dapoli, Dec. 1921, 911! Byculla, Jan. 1925, 910! *Santapau,* Uran, March 1941, 152/1! Purandhar Hill, Dec. 1944, 5579! 5657! Ibid., May 1945, 6188! In addition to these localities just mentioned, I have found this plant in Andheri, Jogeshwari, Mulund, Vehar Lake, Kaneri Caves, Borivli, Thana, Mumbra, Biwandi, Karjat, Khandala, Poona, Diva Ghat, Saswad, etc.

4. **Rungia linifolia** (Wall.) Nees in Wall., Pl. As. Rar. 3 : 110, 1832 ; DC., Prodr. 11 : 469, 1847 ; Clarke, 548 ; Cooke, 401.

Justicia linifolia Wall, Cat. 2447, 1830.

Rostellularia gracilis Wight, Icon. t. 1541.

A plant not easy of identification ; it looks like one of the common Justicias in the inflorescence ; the spikes are less compressed or dense than in the rest of the *Rungia* species of Bombay.

It is a rare plant, which I have not seen in the field. In Kew Herbarium I have examined the following specimens: *Dalzell,* Canara! *Ritchie,* Kala Naddi, Dec. 1852, 1226! *Stocks,* Concan! *Talbot,*

April 1884, N. Kanara, 937! Febr. 1885, 17! March 1892, Jugglepet, 2745! In Blatter Herb. there is one sheet: *Sedgwick,* Dandeli, N. Kanara, May 1917, 2493!

5. **Rungia repens** (Linn.) Nees in Wall., Pl. As. Rar. 3 : 110, 1832 & in DC., Prodr. 11 : 472, 1847 ; Dalz. & Gibs., 196 ; Wight, Icon t. 465 ; Clarke, 549 ; Lindau, 332, Cooke, 401 ; Gamble, 1070.
Justicia repens Linn., Sp. Pl. 15, 1753 ; Graham, 165.

This plant is often confused with *R. elegans* Dalz., which it much resembles ; in general this species is practically glabrous as compared with *R. elegans,* which is hairy all over ; the prostrate habit also distinguishes it from *elegans,* which is erect.

I have always found the corolla blue in colour ; when the plant grows among grasses, which happens quite often, it is erect or suberect ; the long spikes look rather pretty.

The following specimens are mentioned under this species, but some of them may belong to the following one ; see my remarks under *R. elegans. Sedgwick,* Dharwar, 27732! Hubli, Febr. 1919, 5344! 5343! Yelvigi, Dec. 1916, 1928! *Bell,* Thana Dt., Febr. 1918, 3761! *Nana,* Dharwar, Jan. 1919, 5237! *Acland,* Kolhapur, 1920, 909! Deolali, Jan. 1925, 915! Kolhapur, Nov. 1927, 913, 914! *Santapau,* Purandhar, Dec. 1945, 8276! 8289! 8290! *Kulp,* Purandhar, Dec. 1945, 8413! *Santapau,* Talasari, Thana Dt., Oct. 1943, 2937! *Blatt. Herb.,* Nasik, Sept. 1917, 23059! Poona, 23860! Naradana, Khandesh, Jan. 1917, 22679! Tardeo, Bombay, Nov. 1916, 14793! 14789! Purandhar, Dec. 1917, 23094!

6. **Rungia elegans** Dalz. in Dalz. & Gibs., Bomb. Fl. 196, 1861 ; Clarke, 549 ; Cooke, 401.
R. repens var. *villosa* Nees in DC., Prodr. 11 : 472, 1847.

It is with great hesitation that I list this plant as a different species from *R. repens* Nees ; in Blatt. Herb. there are a number of sheets identified as *R. elegans* Dalz.; I took all such sheets with me to Kew Herb. and checked them with the types of both *R. repens* and *R. elegans,* and in every case my specimens matched with the type of *R. repens.* The main difference seems to be the amount of pubescence on the plants ; but among my specimens, as well as among those in Kew Herb., there is every intermediate stage between two not too clear extremes. I consider this species as doubtfully different from the preceding one.

36. DICLIPTERA Juss.

The generic name *Dicliptera* Juss. in Ann. Muss. Par. 9 : 267, 1807 is "nomen conservandum" against *Diapedium* Koen. in Koen. & Sims, Ann. Bot. 2 : 289, 1805 (See Intern. Rules Bot. Nomencl., Append. III, no. 8031).

Key to the Bombay species (after Cooke) :

Tubercles on the seeds glochidiate:
- Corolla 5 mm. long ; capsules pubescent at the apex ; bracts 1.5 mm. broad ... ... *D. micranthes.*
- Corolla 18 mm. long ; capsules pubescent all over ; bracts nearly 13 mm. broad ... ... *D. zeylanica.*

Tubercles on the seeds not glochidiate:
- Flowers in clusters ; bracts lanceolate ... ... *D. Leonotis.*
- Flowers in axillary or terminal lax panicles:
  - Stem and branches glabrous or nearly so ... *D. cuneata.*
  - Stem and branches densely woolly-tomentose ... ... *D. ghatica.*

1. **Dicliptera micranthes** Nees in Wall., Pl. As. Rar. 3 : 112, 1832 & in DC., Prodr. 11 : 484, 1847 (excl. syn.) ; Clarke, 553 ; Dalz. & Gibs., 197 ; Cooke, 402.

This is quite a typical plant, usually extensively branched, more or less procumbent or erect, with small clusters of flowers at the nodes from near the ground level up to the very top of the plant.

Sedgwick, Dharwar, Febr. 1918, 3709! *Santapau,* Khandala, Nov. 1945, 8124! Purandhar, Oct. 1945, 7784! 7785! Ibid. Dec. 1945, 8314! *Blatt. Herb.,* Bhusawal, Khandesh, Dec. 1916, 23128! Naradani, Khandesh, Jan. 1917, 23116! Parel, Bombay, Nov. 1916, 14847! Febr. 1917, 14765! Purandhar, Dec. 1917, 23024!

2. **Dicliptera zeylanica** Nees in DC., Prodr. 11 : 474, 1847 ; Clarke, 552 ; Cooke, 403 ; Gamble, 1073.
   D. bivalvis Nees, *loc. cit.* 475 ; Wight, Icon, t. 1551 ; Dalz. & Gibs., 196 (non Juss.).
   Justicia bivalvis Graham, 164 (non Linn.).

A rather variable plant. Specimens in Kew Herb. are glabrous to pubescent, at times woolly on the stems. My own specimens from Khandala are densely white-woolly on the stems ; perhaps this is due

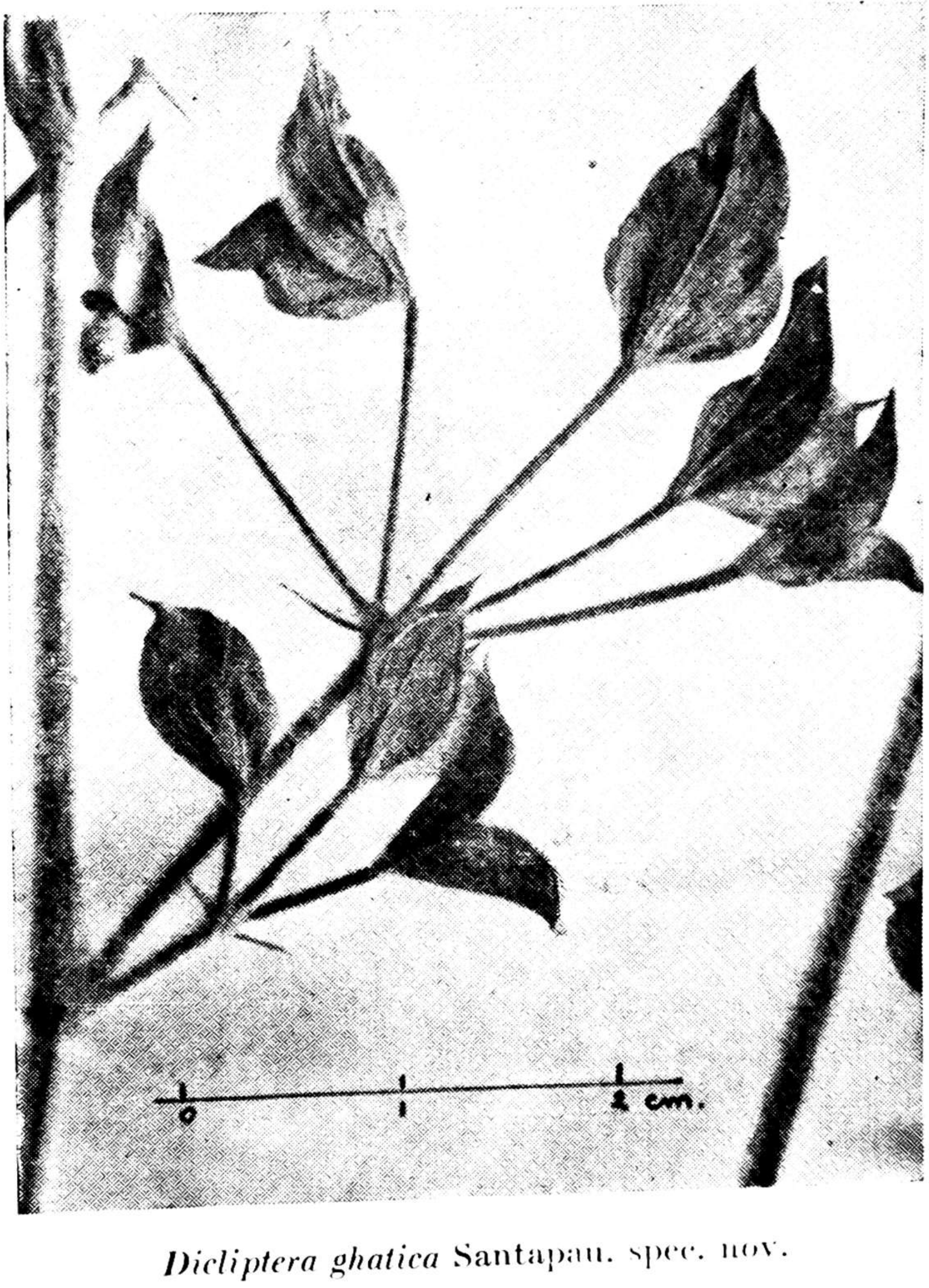
tc climatic conditions. My specimens, moreover, are practically unbranched, and leafless except near the apex of the stems. Flowers bright, pink or rose. It is not a common plant ; it is found by the sides of paths in fairly dense forest, in dry situations.

To the specimens from Khandala, where it is not common, add the following: *Talbot,* N. Kanara, Febr. 1884, 903! *Sedgwick,* Anmod, N. Kanara, Dec. 1917, 3227 ! Dharwar Dt., March 1918, 3827 ! Mahableshwar, Nov. 1918, 4521 ! *Nana,* Yellapur, Apr. 1919, 5865! *Bell,* Dec. 1920, 7728! Karwar, 1921, 152/16! ***Santapau,*** Purandhar, Oct. 1944, 5281! Dec. 1945, 8199! *Blatt. Herb.,* Lohogad Fort, Poona Dt., Oct. 1918, 28575! Castle Rock, N. Kanara, March 1919, 27790!

3 **Dicliptera ghatica** Santapau, spec. nov.

Accedit ad *D. zeylanicam* Nees habitu generali et structura atque pubescentia culmorum atque ramorum ; ab ea tamen differt structura inflorescentiæ et præcipue bractearum. Proxime vero accedit ad *D. cuneatam* Nees, præsertim structura inflorescentiæ et bractearum, differt tamen pubescentia culmorum atque ramorum, longitudine pedunculorum atque pedicellorum et structura bractearum sub pedicellis positarum.

Herba erecta, ramosa ; culmi atque ramuli subtetragonales, dense lanato-tomentosi, grisei. Folia superiora ovata, acuta vel subacuminata, plus minus pubescentia in utraque pagina, ciliata in margine ; petioli 1 – 3 mm. longi, dense pubescentes. Folia inferiora absunt in specimine typico. Inflorescentia axillaris vel terminalis, umbellata vel cymosa ; pedunculi communes 1 – 3.5 cm. longi, lanato-tomentosi, ut plurimum bini, raro singuli, sæpe terni ad singulas axillas ; pediculi 1 – 2.5 cm. longi, 3 – 5 insidentes singulis pedunculis, graciles, lanato-tomentosi ; bracteæ ad apicem pedunculorum sub pedicellis binæ, lineares, patentes, pubescentes 5 – 7 mm. longæ. Bracteæ florales binae, inaequales, quarum una suborbicularis, apiculata, altera vero ovata vel subobovata, acuta vel acuminata, utraque sparse tomentosa et ciliata, fortiter nervosa, primo viridis, tandem straminea ; flores unus vel plures sessiles duabus bracteis inclusi. Calices ad basim fere divisi ; laciniæ subulatæ, sat dense pubescentes. Alabastra extus pubescentia ; ad anthesim corollæ tubus pubescens, gracilis, teres, curvatus ad apicem ; corolla 2-labiata, labio superiori tenuiter longiori quam labio inferiori, rosacea, ad 17 mm. longa. Stamina fere æque longa ac corollæ labium inferius. Ovarium dense pubescens, sed haud glandulare. Capsula obovoidea. obtusa vel rotundata atque minute apiculata in apice, dense tomentosa sed non glandularis ; semina 4, minutissime tuberculata sed non glochidiata.



Dicliptera ghatica Santapau. spec. nov.

Typus inventus est in loco Khandala, Western Ghats, in Statu Bombay, die 20 mensis aprilis anni 1943, et positus est in Blatter Herbario, Bombay (Typus: Santapau 1915).

An erect branched herb ; stems and branches subtetragonal, densely woolly-tomentose, greyish in colour. Upper leaves ovate, acute or subacuminate, more or less pubescent on both sides, ciliate on the margins ; petioles 1 – 3 mm. long, densely pubescent. Lower leaves are not found on the type specimen. Inflorescence axillary and terminal, umbellate or cymose ; common peduncle 1 – 3.5 cms. long, woolly-tomentose, mostly 2 peduncles, rarely one, often three from the same axil ; pedicels 1 – 2.5 cms. long, 3 – 5 in number for each umbel, slender, woolly-tomentose ; bracts 2 at the apex of each peduncle, linear, 5 – 7 mm. long, spreading, hairy with spreading long hairs. Floral bracts in pairs, unequal, one of them suborbicular, apiculate, the other ovate to subobovate, acute or acuminate, both bracts sparsely hairy and ciliate, strongly nerved, at first green, at length straw-coloured ; each pair of bracts enclose one or more flowers. Calyx divided nearly to the base ; segments subulate, fairly densely hairy with short, simple (*i.e.* non-glandular) hairs. Corolla pinkish, up to 17 mm. long ; buds hairy all over outside ; tube pubescent, slender, terete, bent just below the lobes ; corolla limb 2-lipped, the upper lip slightly longer than the lower one ; the whole corolla is pinkish in colour outside. Stamens about as long as the lower lip of the corolla. Ovary densely pubescent, but not glandular. Capsules obovoid, obtuse to rounded and minutely apiculate at the apex, densely hairy with non-glandular hairs all over ; seeds very minutely tuberculate, but not glochidiate.

A gregarious herb growing in large patches in forest clearings at a spot called ' Meroli,' Khandala. The type was collected on the 20th April 1943 at Khandala, Western Ghats, Bombay State, and is kept in the Blatter Herbarium, St. Xavier's College, Bombay. The specific name is meant to commemorate the fact that this new species seems to be confined to the Ghats of Bombay State.

4. **Dicliptera leonotis** Dalz. ex C. B. Clarke, in Fl. Brit. Ind. 4 : 553, 1885 ; Cooke, 404.
D. Burmanni Dalz. & Gibs., Bomb. Fl. 196, 1861 (non Nees).

" Closely allied to *D. micranthes,* but the bracts, flowers, capsules and seeds considerably larger " (Clarke, *loc. cit.*). In Herb. Kew there is but one sheet from Bombay labelled by Dalzell " Anjnera Hill near Nasik 5/74." In Blatt. Herb. there is another sheet, *T. R. D. Bell,* Dandali, N. Kanara, June 1919, 6093!

5. **Dicliptera cuneata** Nees in Wall., Pl. As. Rar. 3 : 111, 1832 & in DC., Prodr. 11 : 481, 1847 ; Clarke, 552 ; Wight, Icon. t. 1552 ; Lindau, 333 ; Cooke, 404, Gamble, 1073.

"Very near the glabrous forms of *D. zeylanica* with congested inflorescence." (Clarke, *loc. cit.*).

37. ECBOLIUM Kurz.

Key to the varieties of Ecbolium linneanum of Bombay :

Bracts entire ... ... var. *lætevirens.*
Bracts with irregularly dentate margins ... ... var. *dentata.*

1. **Ecbolium linneanum** Kurz., var. **lætevirens** (Vahl) Clarke in Fl. Brit. Ind. 4 : 545, 1885 ; Cooke, 405 ; Gamble, 1074.
Justicia lætevirens Vahl., Enum. 1 : 118, 1804 ; Nees in DC., Prodr. 11 : 427, 1847.
J. Ecbolium Linn., Sp. Pl. 15, 1753, p.p. ; Graham, 164 ; Dalz. & Gibs., 194.

Shrubby, up to 1 m. high, somewhat gregarious ; flowers of a peculiar bluish green, fading to greenish white, easily caducous. It has larger leaves, longer spikes and larger bracts than the typical variety, which does not occur in Bombay. This is a common plant on the Ghats, but generally it looks rather wild ; it seems to prefer the shade of forest trees, occasionally it is found in the open.

Sedgwick, Anmod, N. Kanra, Dec. 1917, 3300! Arbail Ghat, Nov. 1917, 3460! Devimane Ghat, Oct. 1919, 6919! *Blatt. Herb.*, Bombay, March 1908, 14886! *Acland*, Dapoli, Sept. 1922, 934! 936! I have found it on several occasions in Khandala, but this species is not so common as the following one.

2. **Ecbolium linneanum** Kurz. var. **dentata** (Klein) Clarke, *loc. cit.* ; Cooke, Gamble, 11.cc.
Justicia dentata Klein, ex Link, Jahrb. 1(3) : 48, 1820 ; Nees in Wall., Pl. As. Rar. 3 : 108, 1832 & in DC., Prodr. 11 : 427.

This is a larger plant than the preceding one, with larger floral bracts and leaves. The spike, *i.e.* bracts and rachis is generally green, but often it is deep purple. The bracts are typically dentate ; often the denticulations only extend to the upper half of the bract's margins,

the base being entire or nearly so ; again there is considerable variation in the depth of the denticulations.

I have found this plant in Khandala, in deep forest.

Graham, Cat. 164, speaks of a variety " common on Malabar Hill, Bombay, with stems like *Plumbago ;* and bracts with curled margins "; probably Graham's plant is the same as this variety, which has bracts with irregularly dentate and conspicuously curled margins.

Acland, Elephanta Island, Sept. 1925, 935! *Blatt. Herb.,* Victoria Gardens, Jan. 1917, 16963! Campoli, Concan, Oct. 1918, 28330! *Santapau,* Andheri, Sept. 1941, 152/22! Borivli, Kaneri Caves, August 1943, 2312!

38. JUSTICIA Linn.

Both in the herbarium and in the field, I have always found this about the most difficult genus of the Acanthaceæ ; the limits between the species are often obscure, and the numerous varieties pass from one species to the other very gradually. Gamble writes about some of the species of *Justicia* in Kew Bulletin 1924 : 239: "The arrangement and analysis of the species of Sect. 6, *Rostellularia,* has been as difficult for me as it has been for previous workers. C. B. Clarke in the F. Brit. India mentions that by Dr. T. Anderson they were collected under 3 or 4 ill-defined species ' and that consequently he was himself obliged ' to arrange them in more species or reduce them to vars. of one.' Actually out of the S. Indian materials he has admitted 6 species but in most of them he has made several varieties. The large series of specimens which I have been lent for my use from various Herbaria has allowed me to arrange the species and varieties somewhat differently, and I have thought it well to revert to the opinions of Nees and other previous writers and to treat some of the varieties as species. I cannot say that I am quite satisfied with the result, but I think that my arrangement brings better together the shrubby ones as distinct from the herbaceous and the high level ones as distinct from those which are found only in the plains. The characters afforded by the comparative size of the bracts, bracteoles and calyx lobes are not always quite reliable nor are those given by the presence or absence of pectinate hairs on and the scabrousness of those organs."

I feel far from satisfied with the present arrangement of the species within this large genus ; Bremekamp in Verh. Nederl. Akad. Wet. (2) 45(2) : 61 & seq., has separated the species of Sect. 6 of Clarke, *Rostellularia* and treated them as a separate genus ; similarly the species

Justicia gendarussa L. has been treated as a separate genus by Nees, Riddley (Fl. Mal. Pen. 2 : 593, 1923), and Bremekamp (*loc. cit.* p. 58); the whole group of species now comprised under the genus *Justicia* requires a thorough revision ; I shall leave the species as they stand in Cooke's Flora until such a revision be published.

Key to species of Justicia of Bombay (adapted from Gamble):

Calyx 5-partite, segments equal or subequal:
- Shrubs ; erect, with flowers 25 mm. long or longer ; leaves up to 20 cms. long ... ... *montana.*
- Herbs or at most undershrubs ; flowers 10 – 15 mm. long ; leaves small, seldom reaching 10 cms. long ; bracts conspicuous:
  - Bracts white with green veins ; ovate or lanceolate, glabrous:
    - Large, shrubby plant ... ... *Betonica.*
    - Small, procumbent herb ... ... *trinervia.*
  - Bracts green with green veins ; erect or diffuse herb ; bracts orbicular spathulate, glandular ciliate, more or less pubescent ... ... *glauca.*
- Erect undershrubs ; flowers up to 15 mm. long ; bracts inconspicuous and narrow:
  - Flowers clustered in the spikes ; bracts linear, very small, bracteoles O ... ... *gendarussa.*
  - Flowers opposite in subinterrupted spikes ; bracts linear-lanceolate ; bracteoles linear, small ... ... *wynaadensis.*

Calyx lobes 4 ; herbs or undershrubs with flowers up to 12 mm. long:
- Spikes cylindric ; bracts and bracteoles as long as or longer than the calyx lobes:
  - Bracts and bracteoles very slender and long, with distant spreading long bulbous-based white hairs. Leaves with raphides irregularly arranged in the middle, transversely near the margins ... ... *micrantha.*
  - Bracts and bracteoles linear, pectinately white-ciliate and scabrous hirsute ; raphides concentrically transverse and curved:
    - Spikes scarcely 25 mm. long, 6 mm. wide ; leaves elliptic-lanceolate or linear ; white hairs of bracts and bracteoles short and close ; bracteoles very narrow ... ... *procumbens.*
    - Spikes up to 50 mm. long ; leaves small, orbicular ; white hairs long and spreading ... ... *serpyllifolia.*
- Bracts elliptic-ovate, bracteoles narrower though similar ; raphides concentrically transverse ; stems diffuse and branching ; bracts more than

2.5 mm. broad ; bracteoles and calyx lobes similar, narrower, all scarious-margined and with soft whitish jointed hairs ... ... *simplex.*

Spikes linear ; bracts and bracteoles shorter than the calyx lobes, all scarious-margined:

Bracts, bracteoles and calyx lobes obtuse at apex ... ... *quinqueangularis.*

Bracts, bracteoles and calyx lobes acute at apex:

Bracts and bracteoles about 2.5 mm. long, much shorter than the calyx lobes:

Prostrate and rooting,much-branched herbs ... *prostrata.*

Erect, tall, slender branching herbs ... ... *Vahlii.*

Bracts and bracteoles scarcely 1.25 mm. long ; calyx lobes usually glabrous, leaf raphides irregular ... ... *diffusa.*

1. **Justicia montana** Wall., Cat. 2471, 1830 (non Roxb.); T. Anders., in Journ. Linn. Soc. 9 : 509, 1867 ; Clarke, 525 ; Cooke, 406 ; Talbot, For. Fl. 2 : 337, f. 447 ; Gamble, 1078.

Hemichoriste montana Nees in Wall., Pl. As. Rar. 3 : 102, 1832 & in DC., Prodr. 11 : 367 ; Dalz. & Gibs., 194 ; Wight, Icon. t. 1538.

In general appearance this plant is very similar to *Adhatoda Vasica,* but smaller in size ; the flowers are large, white or spotted with purple in the throat.

In addition to the specimens mentioned by Cooke, I have examined the following : *Dalzell,* Mahableshwar, Febr. 1848 ! *Talbot,* Ainshi Ghat, Dec. 1891, 2719 ! Nellapore, Febr. 1884, 891 ! *Bell,* Supa, N. Kanara, Apr. 1918, 3873 & 3873 (II) !

2. **Justicia Betonica** Linn., Sp. Pl. 15, 1753 ; Clarke, 525 ; T. Anders., 510 ; Talbot, 338 ; Gamble, 1078.

Adhatoda Betonica Nees, in Wall., Pl. As. Rar. 3 : 103 & in DC., Prodr. 11 : 385, 1847.

J. betonica var. *ramosissima* Clarke, *loc. cit. ;* Cooke, 407.

J. ramosissima Roxb., Fl. Ind. 1 : 129, 1832 ; Graham, 165.

Adhatoda ramosissima Nees, *loc. cit. ;* Dalz & Gibs., 193.

I have followed Talbot and Gamble in fusing the var. *ramosissima* with the typical variety ; Gamble in a MS. note in Kew Herb. states, speaking of *ramosissima :* " not kept up in Fl. Madr. The specimens available could not be separated from the true *Betonica.*" Talbot says that the typical variety is found throughout tropical India and

Ceylon, usually in hedges and near villages, not a forest species. I have examined all the sheets in Kew Herb. even those identified by Clarke himself as belonging to the var. *remosissima* and have failed to discover any constant character by which the variety may be distinguished from the true *J. Betonica.*

Sedgwick, Tadao, Dharwar Dt., Dec. 1916, 1932 ! Mahableshwar, Nov. 1918, 4624 ! *Nana,* Gokak, Belgaum Dt., Febr. 1919, 5479 ! Malavli nr. Lonavla, Sept. 1920, 7438! *Santapau,* Tungar Hill, Sept. 1941, 152/24 ! Bombay, in garden, Sept. 1945, 6907 ! Purandhar, Nov. 1945, 8402 ! 8441 ! *Blatt. Herb.,* Igatpuri Ghat, Sept. 1817, 23029 ! Near Kasara, Oct. 1917, 23040 ! Igatpuri, Oct. 1917, 23042 ! 23043 ! 23044 ! Karjat, Colaba Dt., Oct. 1918, 27996 ! Lohogad Fort, Poona Dt., Oct. 1918, 27488 ! Wadgaon, Sept. 1891, 23853 !

3. **Justicia trinervia** Vahl, Enum. 1 : 156, 1804 ; Clarke, 256 ; Cooke, 408 ; Gamble, 1079.
   Adhatoda trinervia Nees in Wall., Pl. As. Rar. 3 : 103, 1832 ; Dalz. & Gibs., 194.

"A small variety of A. Betonica. T. Anderson." MS. note of Anderson in Kew Herb. It is a sort of miniature *J. Betonica ;* the bracts at times are scarsely white, but generally it is impossible to separate from a small specimen of *J. Betonica.* The leaves may be only 1.5 × 1 cms., the spikes much shorter than in *J. Betonica.*

Sedgwick, Dharwar, March 1918, 3776 ! Konankeri, Dharwar Dt., Dec. 1918, 4941 ! *Bell,* Goddehalli, Karwar, March 1919, 5727 ! Yellapur, May, 119, 6063! *Hallberg and McCann,* N. Kanara, Oct. 1919, 35116 !

4. **Justicia trinervia** Vahl, var. **arenaria** (Nees) Clarke, in Fl. Brit. Ind. 4 : 526, 1885 ; Cooke, 408.
   Adhatoda arenaria Nees in DC., Prodr. 11 : 387, 1847.

"Probably only a linear leaved state of A. Betonica. T. Anders." MS. note in Kew Herb. Cooke further remarks: "Seems scarcely more than a form growing in a stony arid ground."

Sedgwick, Anmod N. Kanara, Dec. 1917, 3230!

5. **Justicia glauca** Rottler, in Ges. Naturf. Neue Schr. 4 : 219, 1802 ; Clarke, 529 ; Cooke, 408 ; Gamble, 1079.
   Gendarussa tranquebarensis Wight, Icon. t. 462, 1840-1843 (non Nees).

Rare in Bombay. The bracts of the spike are practically orbicular, about 5 – 7 mm. diam., and are very typical.

Blatt. Herb., Badami, Aug. 1892, 23856! *Nana*, Badami, Jan. 1919, 5189!

6. **Justicia wynaadensis** Heyne in Wall., Cat. 2474, 1830 ; T. Anders. 515 ; Clarke, 533 ; Cooke, 409 ; Talbot, 339 ; Gamble, 1079.
Gendarussa wynaadensis Nees in Wall., Pl. As. Rar. 3 : 104, 1832.
Adhatoda wynaadensis Nees in DC., Prodr. 11 : 406, 1847 ; Dalz. & Gibs., 194 ; Wight, Icon. t. 1545.

An undershrub with flowers in opposite pairs along the glandular-hairy rachis in interrupted spikes ; the flowers are small, about 10 – 12 mm. long, pink or purple ; when the inflorescence is young and not fully developed, it may not be easy to identify this plant ; but there is no difficulty when the inflorescence is old.

Sedgwick, Anmod, N. Kanara, Dec. 1917, 3388! Dastikop, Dharwar Dt., March 1918, 3665! Kumbharwada, N. Kanara, Apr. 1918, 3881! Konankeri, Dharwar Dt., Dec. 1918, 4942! Yellapur, Karwar Dt., Apr. 1919, 5854! Arbail Ghat, Apr. 1919, 5887! *Bell,* Guddehalli, July 1919, 5762; Ibid., Dec. 1920, 152/17! 152/17*!

7. **Justicia micrantha** Heyne ex Wall., Cat. 2449, 1830 ; Clarke, 536 ; Cooke, 409 ; Gamble, 1080.
Rostellaria crinita Nees in Wall., Pl. As. Rar. 3 : 101, 1832 ; Dalz. & Gibs., 193.

The oldest specific name for this plant is *crinita,* but according to Clarke, MS. in Kew Herb.: "the specific name crinita in *Justicia* is occupied," that is to say, it is preoccupied for another plant or for a mixture of plants ; it is, therefore, not available for the present plant.

There are no specimens from Bombay in Kew Herb. In Blatt. Herb. there are two specimens one from *Sedgwick,* Arbail Ghat, Dec. 1918, 5134, the other from *Nana,* Castle Rock, March 1920, 5622 ; but the correctness of the identification is not beyond reasonable doubt.

8. **Justicia difusa** Willd, Sp. Pl. 1 : 87, 1789 ; Clarke, 538 ; Cooke, 410 ; Gamble, 1081.
Rostellaria diffusa Nees in Wall., Pl. As. Rar. 3 : 100, 1832 ; Dalz. & Gibs., 193.

This and the following species form a difficult group, as they seem to be connected by "imperceptible gradations" among themselves ; C. B. Clarke grouped them as varieties of *J. diffusa ;* Gamble, has

separated them as independent species; the difficulty, however, of proper separation still remains. "A slender but sometimes in old plants quite woody branching herb, with pale flower spikes and leaves, the glabrous capsules small and pointed" (Gamble, 1081).

For the separation of the various allied species, I have followed the key herein appended:

Bracts and bracteoles longer than the calyx segments, or at least equally as long:
  Bracts and bracteoles linear or nearly so ... ... *procumbens.*
  Bracts 2.5 mm. broad or even broader ... ... *simplex.*
Bracts and bracteoles shorter than the calyx lobes:
  Bracts and bracteoles about 2.5 mm. long, fairly densely hairy ... ... *prostrata.*
  Bracts and bracteoles scarcely 1.2 mm. long, more or less glabrous, except for a bunch of hairs at the apex ... ... *diffusa.*

The specimens mentioned under each of these four species have been separated on the basis of this key.

J. diffusa : Sedgwick, Dharwar, Dec. 1916, 2160! Sept. 1917, 3009! Yelvigi, Febr. 1918, 3600! 3600/II! Hubli, Febr. 1919, 5266! 5338! *Nana,* Rahuri, Ahmednagar Dt., August 1919, 6327! *Acland,* Kolhapur, 1920, 877! *Ezekiel,* Chattarhinjee, Poona, May 1917, 30438!

9. **Justicia prostrata** (Clarke) Gamble, in Fl. Madr. 1081, 1924.
J. diffusa var. *prostrata* Clarke, in Fl. Brit. Ind. 4 : 538, 1885; Cooke, 410.

"A small, pale, prostrate plant, the branches long and diffusely spreading from a stout rootstock sometimes almost woody, the flowers pale pink, the capsules small and minutely puberulous, the seeds minutely tuberculate. The leaves are small and usually orbicular or ovate, sometimes slightly lanceolate." (Gamble, *loc. cit.*).

Sedgwick, Kambhatki, Poona Dt., Oct. 1920, 7446! *Blatt. Herb.* Walkeshwar, Bombay, Dec. 1915, 14846!

10. **Justicia Vahlii** Roth, Nov. Pl. Sp. 14, 1821 ; Gamble, 1081.
J. diffusa var. *Vahlii* Clarke, *loc. cit.*, 538, 1885 ; Cooke, 411.

"A tall, straggling narrow-leaved plant from a stout rootstock, the branches with long internodes and angular and scabrous, the flowers

pale with a reddish lip, the capsule pubescent, the seeds papillose." (Gamble, *loc. cit.*).

11. **Justicia quinqueangularis** Koen. ex Rob., Hort. Beng. 80, 1814 ; Fl. Ind. 1 : 134, 1832 ; Clarke, 536 ; Cooke, 411 ; Gamble, 1081.
Rostellaria quinqueangularis Nees in Wall., Pl. As. Rar. 3 : 101, 1832 & in DC., Prodr. 11 : 375, 1847.

" A herbaceous undershrub with curving angular stems and rooting at the nodes and giving erect branches, the flowers small, the capsules obovoid, glabrous, the seeds with wavy subconcentric ridges." (Gamble, *loc. cit.*). The leaves are rather long and narrow, otherwise the plant is very similar to *J. simplex* and *J. procumbens ;* but the hairs on the inflorescence are not jointed, nor are they so abundant as in the other species.

The following specimens are put here only probably; I have matched all my specimens with one of Sedgwick from the Nilgiris. *Blatt. Herb.,* Purandhar, Jan. 1918, 23065! *J. Kulp,* ibid., Sept. 1945, 8430!

12. **J. quinqueangularis** var. **peploides** (Nees) Clarke in Fl. Brit. Ind. 4 : 537, 1885 ; Cooke, 411.
Rostellaria peploides Nees in Wall., Pl. As. Rar. 3 : 101, 1832 ; Dalz. & Gibs., 193.

Leaves somewhat broader ; the whole plant generally smaller than the typical variety. " This var. is very unlike the type in general aspect, and does not graduate into it ; but the obtuse glabrous sepal-tips and large capsule and seeds agree closely " (Clarke, *loc. cit.*).

It may be that some of the specimens mentioned for the previous species belong to this variety.

13. **Justicia simplex** D. Don, Prodr. Fl. Nep. 118, 1825 ; Clarke, 539 ; Cooke, 411 ; Gamble, 1080.

In general appearance very similar to *J. procumbens* Linn. It is a species typical of the hills, going up to 2000 m. " A pale, softly hairy herbaceous branching plant, the flowers pink or lilac, the capsules papery, villous at apex." (Gamble, *loc. cit.*). The bracts are more than 2.5 mm. broad, bracteoles and calyx lobes similar in shape, but narrower, all scarious margined and with soft whitish jointed hairs.

Sedgwick, Dharwar, Oct. 1919, 6610! Arbail Ghat, Oct. 1919, 6573! Londa, Aug. 1917, 2723! Bidi, N. Kanara, Sept. 1917, 2998! Roadsides in forest W. of Dharwar, Oct. 1916, 1857! Dec. 1916, 2026! July 1917, 2670! *Ahmad Khan,* Castle Rock, Aug. 1918, 4190! *Saxton,* N. Gujerat, 1919, 7797! *Bell,* N. Kanara, Aug. 1918, 4255! 5418! *Ezekiel,* Alibag, Sept. 1917, 30396! *Acland,* Juhu, Bombay, Dec. 1924, 938! *Blatt. Herb.* Amalner, Khandesh, Dec. 1916, 23823! *Santapau,* Aug. 1942, Andheri, 691! Saswad, at foot of Purandhar Hill, Oct. 1944, 5358! July 1945, 7269! 7278! Vazirgadh fort, Purandhar, Dec. 1945, 8215! Karjat, Dec. 1948, 9663! Khandala, Oct. 1944, 5392!

14. **Justicia serpyllifolia** (Clarke) Gamble, Fl. Madr. 1080, 1924.
J. simplex var. *serpyllifolia* Clarke, 539, 1885 ; Cooke, 412.

A very small plant ; leaves up to about 12 mm. diam., orbicular or suborbicular ; the inflorescence with white jointed hairs which are long and spreading.

15. **Justicia procumbens** Linn., Sp. Pl. 15, 1753 ; Clarke, 539, Cooke, 412 ; Gamble, 1080.
Rostellaria procumbens Nees in Wall., Pl. As. Rar. 3 : 101, 1832 ; Dalz. & Gibs., 193.

In the field and in the herbarium I have had no little difficulty in separating this species from *J. simplex.* The general appearance of both plants is very similar ; but this species has narrower bracts and bracteoles ; the colour of the flowers is purple, usually dark, deep purple with very dark, purplish green bracts and bracteoles, occasionally the flowers are light purple, and the bracts and bracteoles pure green ; these two forms are very clearly distinct, and possibly may form different varieties ; both may grow side by side in the field, though usually both grow in dense clumps, separated one from the other.

This is one of the commonest plants in open fields in Khandala after the rains, towards the month of October. On very rare occasions the flowers are pure white.

The branching occasionally is profuse from the same node, *i.e.* there may be as many as 7 – 8 branches all coming out at the same node fan-like in arrangement, with long internodes.

Sedgwick, Khandala, July 1917, 2603! Mahableshwar, Nov. 1918, 4526 ! *Nana,* Malavli, near Lonavla, Sept. 1920, 7436 ! Mahableshwar, Oct. 1920, 7636! *Santapau,* Andheri, Makal Caves, Aug. 1942, 681! 691! Purandhar, Sept. 1945, 7189!

Justicia procumbens Linn. Spike highly magnified

16. **Justicia gendarussa** Burm., Fl. Ind. 10, 1768 ; Clarke, 532 ; Graham, 164 ; Dalz. & Gibs., Suppl. 71 ; Cooke, 412 ; Gamble, 1079.
Gendarussa vulgaris Nees in Wall., Pl. As. Rar. 3 : 104, 1832 & in DC., Prodr. 11 : 410, 1847 ; Wight, Icon. t. 468.

A cultivated plant often seen in Bombay gardens as a hedge plant ; I have not seen it wild anywhere.

Blatt. Herb. March 1908, Bombay, 14898! Parel, Bombay, Febr. 1916, 14762! Victoria Gardens, Jan. 1917, 16990! 23200! *Santapau,* Vehar Lake, March 1941, 152/3! Bombay, garden, April 1944, 3962!

39. MONECHMA Hochst.

Monechma debilis (Forsk.) Nees in DC., Prodr. 11 : 411, 1847.
Dianthera debilis Forsk., Fl. Aegypt-Arab. 9, 1775 (non Clarke).
Justicia debilis Vahl, Symb. 2 : 15, 1791 ; Lindau, 439, f. 139 Q.
Monechma bracteatum Hochst. in Flora, 24 : 375, 1841 ; Clarke in Thys.-Dyer, Fl. Trop. Afr. 5 : 214, 1900 ; Cooke, 413.

Spurred lower anther cell as in *Justicia,* but ovary 2-seeded, seeds smooth, in this it differs from *Justicia.* In general appearance this species is quite distinct from any of the common Justicias of Bombay. In 1945 I found this plant near Jamnagar in Saurashtra (Santapau 7619-7621!) and a little later on Barda Hills (Santapau 7880!); it seems to be common in Sausrashtra ; for the rest there are no records from Bombay except for the plants cultivated at Poona and mentioned by Cooke.

40. ADHATODA Nees.

There has been considerable discussion as to the correctness of keeping this genus separate from *Justicia ;* recent Indian botanists keep it separate, but most of the older ones fused the two genera under *Justicia.* Taxonomically there is scarcely a single important characteristic on which to separate these plants. Benth. & Hooker, Gen. Plant. 2 : 1112, say that *Adhatoda* differs from *Justicia* in the non-spurred anthers and from most of the species of *Justicia* in its habit and the structure of its calyx. As Clarke remarks (Fl. Brit. Ind. 4 : 540), it is an error to say that the anther cells are not spurred, and therefore

the genus *Adhatoda* " should be merged in *Justicia* Sect. *Betonica,* following Nees and Anderson." In 1900, however, Clarke in Thys.-Dyer, Fl. Trop. Afr. kept *Adhatoda* separate from *Justicia,* with this remark: " *Adhatoda,* though not well separable from *Justicia* by any one character, is here understood (as by Bentham) to comprise certain shrubs 4 – 12 ft. high, with large leaves and shaggy ovaries, in which the lower of the 2 anther cells is not remote nor very long-tailed, as it is in *Justicia.*"

Adhatoda Vasica Nees in Wall., Pl. As. Rar. 3 : 103, 1832 & in DC., Prodr. 11 : 387, 1847 ; Clarke, 540 ; Dalz. & Gibs., 194 ; Cooke, 414 ; Talbot, 340, f. 448 ; Gamble, 1082.
Justicia Adhatoda Linn., Sp. Pl. 15, 1753 ; Roxb., Fl. Ind. 1 : 126 ; Graham, 164 ; Bot. Mag. t. 861 ; T. Anders., 509.

Commonly planted about villages as a hedge plant ; I have often seen it about Bombay, but in every case it was under cultivation ; I have not seen it truly wild. On several occasions I have searched for the seeds of this plant, but without success.

Blatt. Herb. Purandhar, Dec. 1917, 23033! *Acland,* Kolhapur, Oct. 1920, 883! *Santapau,* Purandhar, Dec. 1944, 5681!

41. RHINACANTHUS Nees.

Rhinacanthus nasuta (Linn.) Kurz in Journ. As. Soc. Beng. 39 : 79, 1870 ; Merrill, Enum. Phil. Fl. Pl. 3 : 488.
Justicia nasuta Linn., Sp. Pl. 16, 1753 ; Graham, 164.
Rhinacanthus communis Nees in Wall., Pl. As. Rar. 3 : 109, 1832 & in DC., Prodr. 11 : 442 ; Clarke, 541 ; Wight, Icon. t. 464 ; Dalz. & Gibs., 194 ; T. Anders., 443 ; Cooke, 415 ; Talbot, 341 ; Gamble, 1083.

This plant is said to be doubtfully wild in Bombay. I have often found it in remote spots in the ravines at Khandala, and from the way it was growing I am satisfied that the plant was truly wild. The leaves of my plants are considerably larger than what is commonly mentioned in the literature or what appears in the specimens in Kew Herb.; a length of 20 cms. is not unusual, 14 – 16 cms. being the average length, the width being proportionate to the length. It is a common plant in some spots in Khandala ; I have not seen it wild except in Khandala and Purandhar.

Blatt. Herb. Purandhar, Dec. 1917, 23034! Victoria Gardens, Jan. 1917, 16962! Bandra, Febr. 1910, 23874! *Santapau,* Purandhar, Dec. 1944, 5680! Khandala, passim!

42. PERISTROPHE Nees.

Key to the Bombay species of Peristrophe :

Corolla 8 – 12 mm. long ... ... *bicalyculata.*
Corolla 5 cms. long ... ... *montana.*

1. **Peristrophe bicalyculata** (Retz.) Nees in Wall., Pl. As. Rar. 3 : 113, 1832 ; Clarke, 554 ; Dalz. & Gibs., 197 ; T. Anders., 521 ; Cooke, 415 ; Gamble, 1084.
Dianthera bicalyculata Retz., in Act. Holm. 297, t. 9, 1775.
Justicia bicalyculata Vahl, Symb. 2 : 13, 1791 ; Graham, 164.

This is a common plant in Purandhar. There seem to be two forms which cannot be ranked as varieties, as they depend mainly on climatic conditions ; the first is erect, extensively branched and common during the moister part of the year, or found growing in moist spots during the rest of the year. The second form is found on dry soil, often on ground from which grasses have been recently burnt ; it is extensively branched, from a stout rootstock, but the branches are nearly flat on the ground and bear leaves which are much smaller than the typical ones of the other form ; often the whole plant forms rosette-like growths on paths, etc. in Purandhar. Flowers in any case pink or light purple.

Acland, Matunga, Nov. 1924, 932! Chinchpokli, Bombay, Nov. 1926, 933! *Blatt. Herb.,* Tardeo, Bombay, Nov. 1916, 14802! Mahim, Bombay, Dec. 1915, 14849! Nimb, Khandesh, 23282! *Ezekiel,* Mahalaxmi, Bombay, Jan. 1917, (without number) ! *Santapau,* Nhava Island, Nov. 1942, 1364! Karjat, Nov. 1943, 3169! Mumbra, Nov. 1944, 5518! Ibid., Dec. 1944, 5562! Ibid. Jan. 1949, 9858! 9859!

2. **Peristrophe montana** Nees in Wall., Pl. As. Rar. 3 : 113, 1832 & in DC., Prodr. 11 : 493 (excl. plant. Khasianis) ; Clarke, 556 ; Wight, Icon. t. 1553 ; T. Anders., 521 ; Gamble, 1084.

This plant is not mentioned by Cooke in his Flora. In Kew Herb. there are two sheets labelled " Dalzell " probably from Bombay, and

another one from Stocks' Herb., labelled "Concan." Clarke gives the distribution of this plant as "W. Deccan Peninsula from the Concan Southward."

Gamble, *loc. cit.*, gives the following notes on this plant: "An erect herb or undershrub with nearly terete stems, the leaves chiefly near the top, elliptic, long-acuminate, subglabrous, up to 7 in. long, 2.5 in. broad, the flower clusters in axillary or terminal 3-5-branched cymes; bracts 2, conspicuous, elliptic, glabrous or slightly villous, nerved, up to .75 in. long; corolla pink, villous without, 2 – 2.5 in. long; anther cells linear, seeds granular-papillose...A handsome erect undershrub with large leaves and flowers, the bracts often also coloured."

References

ANDERSON, T.:

An Enumeration of the Indian Species of Acanthaceæ. In *Journ. Lin. Soc.* 9 : 425 – 256, 1867.

On the identification of the Acanthaceæ of the Linnean Herbarium, in the possession of the Linnean Society of London. *Ibid.* 7 : 111 – 118, 1863.

BEDDOME, R. H.:

Icones Plantarum Indiæ Orientalis: or Plates and descriptions of new and rare plants from Southern India and Ceylon. 1868—1874.

BENTHAM, G. & J. D. HOOKER:

Genera Plantarum...1862—1883; Acanthaceæ in 2 : 1060 – 1122, 1876.

BLATTER, E.:

New Species of Indian Plants. In *Journ. As. Soc. Beng.* (N.S.) 26: 339 – 365, 1930.

BREMEKAMP, C. E. B.:

Materials for a Monograph of the Strobilanthinæ (Acanthaceæ). In *Verh. Nederl. Akad. Wet.* (II) 40(1) :1 – 306, tt. i – iv, 1944.

Notes on the Acanthaceæ of Surinam. In *Rec. Trav. Bot. Neerl.* 35 : 130 – 174, tt. xiii – xvi, 1938.

A Preliminary Survey of the Ruelliinæ (Acanthaceæ) of the Malay Archipelago and New Guinea. In *Verh. Nederl. Akad. Wet.* (II) 45(1) : 1 – 39, 1948.

Notes on the Acanthaceæ of Java. *Ibid.* 45(2) : 1 – 78, 1948.

BROWN, R.:

Prodromus Floræ Novæ Hollandiae et Insulaae van Diemen. 1810.

CLARKE, C. B.:

Acanthaceæ in Hook. f., Fl. Brit. Ind. 4: 387 – 558, 1884 – 1885.

COOKE, TH.:

The Flora of the Presidency of Bombay. 1901—1908. *Acanthaceæ* in 2 : 339 – 417, 1904.

DALZELL, N. A.:

Contributions to the Botany of Western India. In *Hooker's Journ. Bot. & Kew Gard. Miscell.* vols. 2 – 4, 1850 – 1852.

DALZELL, N. A. & A. GIBSON:
The Bombay Flora...1861.

DON, D.:
Prodromus Floræ Nepalensis. 1825.

GAMBLE, J. S.:
Flora of the Presidency of Madras. *Acanthaceæ* in 1003—1085, 1924.

GRAHAM, J. :
A Catalogue of Plants growing in Bombay and its Vicinity...1839.

HOCHSTETTER, C. H. F.:
Plantarum Nubicarum Nova Genera...In *Flora* 24 : 396 – 377, 1841.

HOHENACKER, R. F.:
Verkäufliche Sammlungen getrockneter Pflanzen. Metz, pl. Indiæ orientalis Sect. II. Pl. e territoriis Canara, Mahrattarum australiori et Malayalim. In *Flora* 32 : 556 – 560, 1849.

KIRTIKAR, K. R.:
The Poisonous Plants of Bombay. In *Journ. Bomb. Nat. Hist. Soc.* 7 : 61 – 76, 1892.

KUNDU, B. C.:
The Morphology of the Spines of Hygrophila spinosa T. Anders. In *Journ. Bomb. Nat. Hist. Soc.* 43 : 678 – 680, t. 1, 1943.

KURZ, S.:
On Some New or Imperfectly Known Indian Plants. In *Journ. As Soc. Beng.* 40 : 45 – 78, 1871.

LINDAU, G.:
Acanthaceæ, in *Engl. & Prantl, Pflanzenfamilien* 4(3B) : 274 – 354, ff. 104—141, 1895.
Ubersicht über die bisher bekannten Arten der Gattung Thunbergia L.f....In *Engl. Bot. Jahrb.* 17, Beibl. 41 : 31 – 42, 1893.

MERRILL, E. D.:
An Enumeration of Philippine Flowering Plants. 1923—1926.
An Interpretation of Rumphius's Herbarium Amboinense. 1917.

NEES VON ESENBECK, C. G.:
Acanthaceæ Indiæ Orientals. In Wallich, *Pl. As. Rar.* 3 : 70 – 117, 1832.

Characters of New Species of Indian Acanthaceæ. In *Hook. Comp. Bot. Mag.* 2 : 310 – 311, 1837.
Lepidagathidis...Illustratio Monographica...1841.
Acanthaceæ, in *DC., Prodr.* 11 : 46 – 519, 1847.

RADLKOFER, L.:

Ueber den systematischen Werth der Pollenbeschaffenheit bei den Acanthaceen. In *Sitz. k. Bayer. Akad. Wiss.* 13(2) : 256 – 314, 1883.

ROTH, A. W.:

Novæ Plantarum Species præsertim Indiae Orientalis, ex coll. Dr. Benj. Heynii. 1821.

SANTAPAU, H.:

The Flowering of Strobilanthes. In *Journ. Bomb. Nat. Hist. Soc.* 44 : 605 – 606, 1944.

TALBOT, W. A.:

Forest Flora of the Bombay Presidency and Sind. 1909 – 1911.

THWAITES, G. H. K. & J. D. HOOKER:

Enumeratio Plantarum Zeylaniæ. 1858-1864.

WALLICH, N.:

Tentamen Floræ Napalensis Illustratæ. 1824 – 1826.
A Numerical List of Dried Specimens of Plants in the East India Company's Museum...1828 – 1849 (generally referred to as Wall., Cat.).
Plantæ Asiaticæ Rariores. 1829 – 1832.

WIGHT, R :

Icones Plantarum Indiæ Orientalis...1838 – 1853.
Illustrations of Indian Botany...1840 – 1850.

Appendix

References to Herbarium specimens cited in this paper :

Acland, The Rt. Rev. R. D.: 877, 883, 884, 886, 887, 888, 889, 890, 895, 898, 899, 900, 901, 902, 903, 904, 905, 909, 910, 911, 912, 913, 914, 915, 916, 917, 919, 920, 922, 923, 924, 925, 926, 927, 928, 929, 930, 932, 933, 934, 935, 936, 938, 942, 943, 945, 946, 951, 953, 954, 955, 956, 957, 958, 959, 1425.

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Blatter Herbarium: The specimens here listed were collected mainly by Blatter, Hallberg or McCann ; but the sheets do not bear the name of the collector. In the impossibility of determining exactly who the collector is, I have grouped such sheets under the general name of "Blatter Herbarium": 1588, 14081, 14762, 14765, 14772, 14780, 14787, 14789, 14790, 14793, 14798, 14802, 14805, 14806, 14831, 14832, 14834, 14835, 14837, 14838, 14839, 14840, 14841, 14842, 14843, 14844, 14845, 14846, 14847, 14849, 14852, 14856, 14858, 14861, 14886, 14897, 14898, 14899, 14900, 14901, 14911, 14914, 15631, 16962, 16963, 16964, 16966, 16980, 16982, 16990, 17384, 20939, 22640, 22679, 22680, 22818, 22858, 22905, 23022, 23024, 23029, 23031, 23033, 23034, 23035, 23037, 23040, 23042, 23043, 23044, 23047, 23056, 23059, 23065, 23069, 23070, 23071, 23077, 23078, 23081, 23082, 23084, 23094, 23096, 23105, 23107, 23109, 23114, 23116, 23128, 23131, 23165, 23173, 23175, 23178, 23179, 23180, 23190, 23200, 23282, 23283, 23349, 23356, 23807, 23823, 23829, 23831, 23834, 23844, 23845, 23850, 23853, 23856, 23858, 23860, 23863, 23874, 23875, 23879, 23905, 26666, 26813, 27006, 27015, 27112, 27147, 27160, 27179, 27257, 27296, 27388, 27390, 27395, 27488, 27790, 27987, 27996, 28038, 28324, 28330, 28331, 28354, 28402, 28425, 28575, 28638, 28642, 28756, 28882, 28912, 28921, 28939, 28942, 29005, 29591, 29601.

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Addenda and Corrigenda

Page	*Line*	*Reads*	*Correct to*
8	1	*lata*	*alata*
9	23	Add: Lately I have seen the plant at Mahableshwar, where it was probably cultivated ; I have also seen specimens from N. Kanara, where it seems to grow in the wild state.	
9	33	Rozb.	Roxb.
10	4	t.13E, Bor.	t.13E ; Bor
12	4	habits	habit
13	29	screeping	creeping
24	1	ellictic	elliptic
26	14	axiles	axils
26	20	Hemigraphis	*Hemigraphis*
32	diagr.	The spurs of the anthers of *D. vagans* should be 0.5 mm. broad, and only 3 mm. long in the diagram.	
38	15	Nilgirianthus asper (Nilgirianthus asper Santapau) Santapau.	
41	29	Mahaleshwar	Mahableshwar
41	30	Add: *Santapau,* Mahableshwar, Nov. 1950, 11801, 11803 !	
49	34	Add: *Santapau,* Mahableshwar, Nov. 1950, 11931, 11932 ; *Bole,* ibid., April 1951, 180 !	
50	6	Add: *Santapau,* Mahableshwar, Nov. 1950, 11958-11961 ; *Bole,* ibid., April 1951, 101 !	
54	18	Corolla,	Corolla
59	9	sesile	sessile
74	39	Ill. Monor.	Ill. Monogr.
86	3	*remosissima*	*ramosissima*
92	27	Add: In January 1951 I saw this plant in seed at Bangalore, where it seems to set seed quite readily.	